TEXTILE WORLD

KINK BOOK

VOLUME IV

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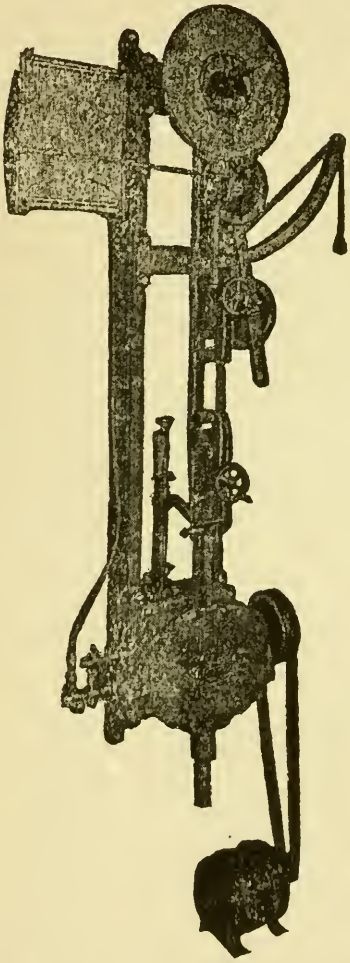

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TEXTILE WORLD

KINK BOOK—VOL. IV

COMPILED FROM THE COLUMNS OF

TEXTILE WORLD

BY

CLARENCE HUTTON
(*Technical Editor, Textile World*)

BRAGDON, LORD & NAGLE COMPANY, INC.
Publishers
NEW YORK, U. S. A.

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FOREWORD

This volume, like earlier Kink Books, has been compiled from the Questions and Answers department of TEXTILE WORLD. It represents the final sifting out of the thousands of questions received by the editors in the course of a year, to preserve in permanent form hard-to-get information on problems that are of more general interest. Most of the information included in this volume is not available elsewhere in any form. The volume is carefully indexed to increase its reference value.

It should be noted that prices, where given, are those of 1920, which were unusually high in most cases.

We are glad to make acknowledgment to the many broad-minded men in the industry who have contributed information in answer to problems. It is only by their co-operation that such a volume of kinks, formulas, recipes, tables and other technical information could be brought together.

It is impossible in any number of volumes to cover all the problems which arise in textile manufacturing, and the reader is invited to make use of the Questions and Answers page of TEXTILE WORLD for advice on any questions which may occur with changes in manufacturing conditions and market demands.

TEXTILE WORLD

BRAGDON, LORD & NAGLE CO., INC.

Publishers

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The Industry and Art of Winding

When J. R. Leeson originated the method of winding now known the world over as "Universal," winding machines were supplied by makers of other types of textile machinery merely as adjuncts, not as capital necessities.

To-day all progressive manufacturers recognize that skill and capital invested in spinning, weaving, knitting and other processes of textile manufacture cannot be efficiently or economically operated unless supplemented by accurate, dependable methods in winding.

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KINK BOOK—VOL. IV

Tire Fabric Constructions

How many kinds of tire fabric are there? What ply yarns are used in both filling and warp in the different fabrics? What is the count of the single yarns which go to make up the ply yarns? (3869)

There are at least 500 different constructions of tire fabric, and the number may possibly run well over 1,000 if we count every slight change made in cotton mixtures, yarn numbers, or turns of twist in the yarn, etc. There are 4 different types of tire fabric, and perhaps it is these the inquirer wishes general particulars of. First there is the standard flat builder fabric, which is really the most important type. Next there is the cord fabric; then there are also the bead fabric and the breaker fabric.

The standard flat builder fabric commonly weighs 17¼ ounces per square yard, and is made in all widths from 48 inches to 90 inches. The yarn is 11 ply, 23s warp and filling, with 23 ends and 23 picks per inch. It is made from both combed and carded yarns, mixtures of various cottons, various yarn twists, and other slight variations to meet the customer's wishes. These details of construction are generally supplied by the purchaser.

The cord fabric standard seems to be a 15-ply, 23s yarn for warp, with 25 to 27 ends per inch of warp, and single 20s filling, with 2½ to 9 picks woven per inch. The picks are generally nearer 2½ than the higher number. For the warp the single yarns are twisted to the right the same as in the single yarn, to make 5 ply. Then 3 of these 5-ply yarns

are twisted to the left to make the 15-ply warp. A great distinction in the yarns from the builder fabric is in the direction of the twist as stated above, which is right-hand in the first twist and left-hand for the final twisting.

The bead fabric is generally made from 4/23s warp and filling, with 35 ends per inch in the warp and 35 picks per inch in the filling. The bead, cord and builder fabrics are woven with the plain weave.

The breaker fabric is generally made from 12-ply, 20s yarn in both warp and filling, with 10 to 12 ends to an inch, and 10 to 12 picks per inch. For this fabric the weave may be either a leno or a plain weave. We know of one instance where the breaker fabric made with the leno weave has a 7-ply, 20s warp and a 12-ply, 20s filling.

Constructions are constantly changing according to the ideas of the tire manufacturers, and generally full specifications as regards yarn sizes, twists, widths and number of threads and picks per inch are given by the customers.

Difficulty in Dyeing Yarn to Shade

Why is it that cotton yarn dyed in the skein in 100 and 400 pound lots is rarely the same as the original shade, always being a little off color, and sometimes streaked? Can this be remedied? (3777)

This question can be understood in two ways. We understand the inquirer to mean that he finds it difficult to secure the same shade on 100 to 400-pound lots of yarn as on trial dyeings.

In dyeing big lots from a small trial, we would advise using about 10 per cent. more color and the starting of your baths at a lower temperature. Also do not add all your salt at one time. The cause of your shade being streaked might be due to the dyestuff being one that it is hard to work evenly, or it might be due to your starting the temperature of the bath too high, and with your salt added in at one time you thereby force the color into the yarn too quickly, which causes uneven dyeing. Before dyeing you must be careful to give the yarn a good clean boiling-out, which is very essential in order to get good results.

For very light shades we would suggest using one-half of 1 per cent. Monopole oil which would aid in leveling the color. In dyeing medium or heavy shades, add one-quarter

of the amount of salt necessary when starting the dyeing, and the other three-quarters near the boil, or after the bath had started boiling. This gives the dyestuff a chance to get on the fabric in all its parts before the major portion is precipitated on the fiber.

If your trouble has been along the lines of getting successive lots off-shade, streaked, etc., we would suggest that you experiment with different dyestuffs and watch your procedure very carefully in order to see which give the best results.

Machinery for Bleaching and Finishing

1. What machinery would be necessary for bleaching and finishing 30,000 yards per week of cambric 36 inches wide—72 x 68 count?

2. What machinery would be necessary for printing and finishing, one or two colors on white ground, and one color on black ground, 30,000 yards per week of cotton cloth 36 inches wide—56 x 44 count?

Please bear in mind that the amount of machinery should be reduced as low as possible inasmuch as the amount of cloth to be handled is so small. (3692)

Thirty thousand yards per week of cambric 36 inches wide—72 x 68 count, is too small a quantity of goods to be run to advantage in a bleachery and finishing plant, as even by boiling every other day the quantity would be only a little over 1 ton of goods, and we usually consider that 2½ or 3 tons is the minimum to be handled to advantage, and even then only under special conditions. However, we give an approximate list of machines required, although with slight changes such machinery would be capable of running many times the quantity mentioned.

1 gray room power-driven sewing machine.
1 bleach house foot-driven sewing machine.
1 6 x 7 kier.
1 set of chemic agitator fittings to go with concrete tank.
1 5 x 5 caustic mixing tank.
2 bleach house washers.
2 squeezers to run with washers.
1 chemic squeezer.
1 sour squeezer.
About 12 bleach house reels.
1 scutcher.
1 3-roll water mangle.

1 2-roll starch mangle.

1 upright drying machine with, say, 12 or 15 cylinders.

1 sprinkling machine.

1 3-roll calender, although most cambrics are finished on 5 or 6-roll calenders.

Necessary cloth room machinery, such as hooking or folding machine, press, etc.

With regard to machinery for printing and finishing with one or two colors, in addition to the rest of the machinery noted above, there would be required in all probability

1 gas singer.

1 20 or 30-foot tenter.

1 3-color printing machine with overhead rigging or drying cylinders complete.

1 small ager.

1 open washing machine and drying machine to run in connection with it.

1 forcing jack.

For this class of goods the 3-roll calender would undoubtedly be sufficient.

You will readily see from these lists the impracticability of putting in bleacheries and finishing plants for such a small quantity of goods, except under very unusual conditions.

Reed Calculations

Could you please give me a rule for finding the number of reed to give a desired sley? For instance, I want a 26-sley cloth, using 2 threads per dent. What number reed shall I order to give me this? (3826)

To determine the reed for any desired sley by means of calculations requires, in addition to suitable rules, a considerable amount of practical experience in designing and weaving. Rules that give fairly accurate results on usual constructions may be very wide of the mark on unusual constructions where the number of picks is very small compared with the number of warp threads, or where the filling is unusually heavy. A common rule to find the number of dents per inch in reed to produce a given sley is as follows:

Rule: Deduct 1 from the sley and divide the remainder by 1.05 where there is 1 end in a dent of the reed; by 2.1 when there are 2 ends in a dent; by 3.15 when there are 3 ends in a dent, and by 4.2 when there are 4 ends in a

dent. Applying this rule to the example in question would give the following results:

26 (sley) — 1 = 25
25 ÷ 2.1 = 11.9, number of dents per inch in reed.

This question was referred to a designer in a large cotton mill, and his reply is as follows:

HOW TO FIGURE SLEY REEDS

There is a lot more to reed calculations than is generally understood, and for that reason I have gone into the problem thoroughly in replying to the question. A certain amount of contraction takes place as the cloth is being woven. This contraction will average from 5 to 7 per cent. on cloths such as lawns, sheetings, pongees and voiles, and when figuring a reed must be allowed for.

The contraction will vary according to the density of the sley and the kind of warp and filling used. If the sley is very heavy, there is some difficulty in getting the correct number of ends per inch to lie in the cloth. The following rule will provide to some extent for the increase in density of sley:

Rule: Deduct 1 from the sley, multiply by .95, and the answer will be the ends per inch as they lie in the reed (not in the cloth). Divide this answer by 2 and the result is the number of dents per inch in the reed, if the warp is drawn 2 ends per dent.

The following examples show the way the above rule works out. (It is termed the sliding reed scale.) Assume that a piece of cloth is wanted with 50 sley. What would be the ends and dents per inch in reed?

50 — 1 = 49
49 × .95 = 46.55
46.55 ÷ 2 = 23.27, number of dents per inch in reed.

Now assume that a piece of cloth is wanted with 100 sley. What would be the ends and dents per inch in reed.

100 — 1 = 99
99 × .95 = 94.05
94.05 ÷ 2 = 47.02, number of dents per inch in reed.

In the first example 7 per cent. has been allowed for contraction. In the second example 6 per cent. has been allowed, the difference being on account of the higher sley of the second example.

Taking up the problem of the inquirer, he wants a cloth with 26 ends per inch drawn 2 ends per dent.

$26 - 1 = 25$

$25 \times .95 = 23.75$

$23.75 \div 2 = 11.87$, number of dents per inch in reed.

Friction Load in Worsted Yarn Manufacturing

What would be considered the proper percentage of the friction load to the entire horsepower used to run a room of open worsted drawing? Also a cap spinning-room?

(3840)

A great deal depends upon the arrangement of machines, size of machines, character of work being done, and nature of drives. It would have been better if the inquirer had given some information on these points. However, it is probably safe to say that the percentage of the friction load to the entire horsepower in worsted drawing will vary between 12 and 25 per cent. Tests made with polyphase watt-meters give various readings between these two figures. It would be well to allow from 15 to 20 per cent. for friction load in a room, as it is better to have a little surplus power for maximum production.

The friction load in a cap spinning-room with 1 motor and 2 lines of shafting was 13.5 per cent. With well lined shafting, 15 per cent. would be a safe figure to use. The friction load will vary considerably if the shafting is allowed to run out of line or if belts are put up very tight.

Power for Woolen Machinery

Would you kindly advise us the size motor required in each of the following departments:

1. One motor for carding-room, consisting of 7 sets of Davis & Furber 48 x 48-inch cards, running 90 revolutions.
2. One motor for spinning department, having 9 Davis & Furber mules, 320 spindles each.
3. One motor for 51 looms of various makes, averaging about 100-inch reed space, operating in 4 harness work, and at about 90 picks per minute.
4. One motor for 3 4-string Hunter washers, 2 Hunter fullers, two hydro-extractors, 3 Cleveland drum 96-inch dryers and 3 96-inch Woonsocket nappers.

We only wish the approximate sizes which you think would

be required to drive this machinery in the way we have divided it, and would thank you very much if you could let us have this information. (3711)

Only approximate information can be given as necessary particulars regarding layouts, speeds of some of the machines, and makes of some machines, are not supplied. However, we believe the following motors will make a satisfactory installation: For Department 1, 30-H.P. motor; for Department 2, at 4 stretches per minute, 40-H.P. motor; for Department 3, 40-H.P. motor; for Department 4, 50-H.P. motor.

Redyeing Khaki

We are enclosing herewith small sample of gray cloth supposed to have been dyed on khaki, and would be glad if you could give us information as to how this gray can be dyed without staining the white more than in the sample enclosed. We presume it is dyed on the theory that the white in the original khaki has not been mordanted with Bichromate of Soda, and consequently, if the piece is dyed in a black that will only go on the bottom chrome, the wool that is already mordanted will take the black, and the unmordanted will remain white. We have made experiments on this basis, but so far we have been unable to get the white without being slightly stained. We would be glad if you would advise us if you know of any color that would dye the mordanted wool black and leave the white wool as clear as in the sample enclosed. (3726)

The sample of cloth submitted has every appearance of having been a khaki re-dye. In order to obtain good results with this class of goods, it is required that they be very well cleansed by giving a preliminary scouring with a good soap. The object of this operation is to remove every trace of loose old dye that might in any manner impair the clearness of the desired new shade. In an article by Dr. Matos, published in the September 27, 1919, issue of TEXTILE WORLD, there are given a number of dyeing recipes for two-toned effects on khaki goods, where the white or undyed fibers are the basis for the gray tones as shown by the sample of goods under discussion.

A black may be obtained upon these fabrics by using hematine crystals and wool yellow extra conc. in the proportion of 3 pounds of the former and about ¼ of the latter for each 100 pounds of cloth, but, as every dyer knows, it

will be best to make a trial dyeing first to determine th exact proportions. No mordant is necessary because th cloth already contains chrome, but there will be require about 1 pint of oil of vitriol for each unit (100 pounds) c cloth. Reference to the above-mentioned article will giv all the details for this work, together with details for man other shades that are now being demanded upon all classe of government cloth that require redyeing.

Silk Degumming Machines

Can you give us any information as to the kind of machin most suitable for degumming 12-thread tram silk in skeins (3709)

Most of this work is done on sticks, in an ordinary ope bark or vat, about 30 inches wide, 2 feet deep, and sufficientl long to accommodate the amount of material which it i desired to ungum. There is a machine made for this purpos in Switzerland, the patents for which are controlled b Schmidt Freres of Basle, Switzerland, which does very goo work on large lots. It is probable, however, that the simpl vat will be what is required.

Dyeing Artificial Silk

We wish to start dyeing artificial silk, and would appreciat whatever information you could give us relating to necessar machinery, method of handling this fiber in the piece, etc This would apply to all the different kinds of artificial silk and also as to the best kind of dyestuff to use on same. (3689)

Unless this correspondent has had some experience i dyeing artificial silk, it will be found better to engage th services of an expert in this line of work, for the reason tha the cost of dyeing is rather high and there is no opportunity to experiment. There are three different kinds of artificia silk generally met with in practice, viz.: Viscose silk, Elber feld silk, and Chardonnet silk. Each of these silks possesses different properties as regards dyeing, and there are certain modifications of the dyeing operation that must be looked after when each is being treated. These modifications are to be constantly kept in mind if the dyeing is being done in

a commercial dye house, and are to be gained only after considerable experience.

Chardonnet silk has a strong affinity for the basic dyes, with which it can be dyed without mordanting, while both the Elberfeld and Viscose silks are preferably mordanted with tannin and antimony, much after the method for cotton. The direct colors are much used for dyeing both the Elberfeld and Viscose silks, on account of the simplicity of application and general excellence of the results. The method is as follows: The bath is prepared with 1 per cent. sal soda, 2 per cent. of any good quality of soluble oil, and 10 per cent. of anhydrous Glauber's salt. The volume of the bath should be about 30 times that of the weight of the material to be dyed. Dyeing progresses for ½ to ¾ hour, at a temperature of 85 to 95 degrees F. The goods should be kept in constant motion so that no "shaded" portions are possible. For light shades, the dyestuff may be added to the bath in successive portions, so as to guard against any unevenness. For heavy shades and blacks, the proportions of the bath may be about as follows: 1 per cent. sal soda, 2 per cent. soluble oil, and from 15 to 20 per cent. of calcined Glauber's salt. The bath may advantageously be more concentrated, and the temperature raised to about 140 degrees F.

Dyeing with the basic dyes, the artificial silk is prepared in a bath with 2 to 4 per cent. of tannic acid, and ½ per cent. of muriatic acid, and kept at a temperature of 120 degrees F. for 2 to 3 hours. The silk is then well washed and immersed in a bath (cold) containing from 1 per cent. to 2½ per cent. of tartar emetic, or equivalent of antimony salt, for ½ hour, then washed, and the dyeing proceeded with.

The dyeing machinery for artificial silk goods is about the same as for ordinary silk goods when dyed in the piece, but it should be remembered that artificial silk has only about 20 per cent. of its normal strength when wet, and must be handled accordingly.

Finishing Shoe Laces

Enclosed find sample of shoe laces; I would be pleased if you would tell me the process through which laces are put in order to obtain this finish. (3684)

After having been delivered from the braiding machine, the laces are dyed, usually with sulphur colors, and then are

made ready for the finishing process, which, in this case, consists of impregnating with a solution of caseine, dissolved in borax or ammonia. This makes a perfect waterproofing solution, and when applied to such a material as braids, permits of a very good finish. The finish is made by passing the saturated and dried braid over several polishing rolls, at the same time applying sufficient pressure to give density, and also to cause the dressing to penetrate every interstice.

Underwear Yarn

Under separate cover I am mailing you a bobbin of underwear yarn, and I would be much obliged if you would examine this and let me have your opinion of the carding and spinning on this yarn; also your reason for the statements which you make. (3697)

The sample shows that the stock is carded out good while there is some little unevenness in the yarn, which is caused by the long staple that is rather long to properly blend with the fine cotton. The principal defect of the yarn is caused in the spinning. It is not wound on the bobbin properly. The remedy lies in the proper adjustment of the quadrant arm, which should be set back further so that the wind will start quicker; also set the back-off ratchet over further so that there will be less slack yarn at the beginning of the wind. These adjustments should produce a good firm bobbin.

Iron Stains on Knitted Fabric

I am enclosing two clippings of knitted goods showing brown stains. After examination kindly advise possible cause and a remedy. These stains appear when the goods are taken from the Rodney Hunt kicker fulling mills after scouring. They are scoured in a liquor composed of water, Palmolive fulling soap and 58 per cent. light soda ash. Before using, the water is pumped from the stream to a steel tank where it is heated to proper temperature and carried in iron pipes to the kickers. The opening from the tank is covered with very fine wire netting and all bolts that are likely to come in contact with the goods are covered with cloth. (3727)

These stains are distinctly iron, and show so upon being tested with yellow prussiate of potash in the usual manner. As to how they got on the goods, it is very difficult to venture

an opinion, especially at a distance, and without knowing every detail of the mechanical arrangements of the plant through which the goods pass from one process to the next. From the shape of the spots, they appear to have been caused by some iron-containing liquid or solution dropping upon the fabric, which suffered some change in one of the processes.

Such spots have been known to be caused by a fragment of pipe scale becoming detached by friction of water in the pipes, and then attaching itself to the goods, remaining there for some time, during which the stain formed and became fixed by the subsequent alkaline scours and washings. It is suggested in the present instance for the foreman to carefully follow several pieces through all the operations and see in just what condition they emerge. Of course, it will be necessary to examine the goods most thoroughly before they are put through any of the wet processes, so as to be absolutely sure that no cause for stains exists upon the fabrics before wetting. It is a fact that some stains only show distinctly after fulling, while the direct cause of the stain was on the goods before.

Cut Marks on Black Warp

Can you tell me of something to use on the slasher that will make a cut mark on a black warp that can be seen plainly when it comes up on the loom. (3699)

We would suggest that the enquirer ask the boss dyer to make him a strong pink dye mixture. Then reduce some ordinary white crayon to a powder and mix with the dye, taking care not to make the mixture too thick or it will stamp on the slasher cylinder and make repeat marks on the warp. The mixture is put into the cut-mark pan and used in the regular way, although it is advisable to bind the daubers together, making one strong mark instead of two light marks several inches apart. Yellow dye can be used in place of the pink dye if desired.

Speed and Settings for Worsted Card

At what speed would you run a worsted carding machine working on ¼, ⅜ and ½ blood? What kind of clothing would you use, and how would you set the rollers? The dimensions are as follows: Cylinder, 54 inches; workers, 12

inches; strippers, 6 inches; fancies, 16 inches; doffers, 40 inches. (3739)

As your range of work is rather wide, viz.: ¼ to ½ blood, equal to 40s to 60s English counts, the card needs to be run and clothed so as not to be too fine for the ¼ blood, and still fit to deal with the ½ blood. The following will about fit your case:

1st Licker-in	8	R.P.M.
2d Licker-in	12	R.P.M.
3d Licker-in	50	R.P.M.
4th Licker-in	100	R.P.M.
1st Divider	3	R.P.M.
2d Divider	3¼	R.P.M.
3d Divider	3½	R.P.M.
4th Divider	4	R.P.M.
Cylinders	100	R.P.M.
Workers	3	R.P.M.
Strippers	160	R.P.M.
Fancies	210	R.P.M.
Doffers	5	R.P.M.

CLOTHING

	Wire	Count	Crown
1st Licker	Garnett	..	..
2d Licker	24	60	6
3d Licker	26	80	8
4th Licker	30	100	10
1st Divider	24	60	6
2d Divider	26	80	8
3d Divider	29	90	9
4th Divider	31	110	10
1st Cylinder	31	110	10
1st Workers	32	115	10
1st Strippers	27	30	3
1st Fancy	29	60	7
1st Doffer	32	110	10
Angle Stripper	30	110	10
2d Cylinder	33	125	12
2d Workers	34	130	12
2d Strippers	30	90	9
2d Fancy	31	70	7
2d Doffer	34	130	12

SETTING OF ROLLERS

As setting varies so much for different qualities, it is impossible to lay down any hard and fast line. But whatever

quality is being dealt with, there is a rule that must be strictly adhered to, the early rollers must not be set so close to each other as those farther on in the card. Use a carder's gauge. The different blades vary from about 1/40 to 1/80 of an inch. For the lower grades start with the thickest blade tapering to about the 1/60 gauge, and for the finest use the 1/80.

In setting the workers give a fair space to the first worker, tapering down to the third. This prevents all the work being thrown onto the first and second workers. Set the angle stripper fairly close to both doffer and cylinder. This insures both clean stripping and delivery. With the exception of the fancy, no roller must touch another; and the fancies must only just press hard enough to lift the fiber to the points of wire on the cylinder, so that it is readily taken forward by the doffer.

Bleaching Artificial Silk Hosiery

Will you kindly give us some information as to the best method of bleaching artificial silk hosiery with mercerized tops, heels and toes. We find that with our method if the goods remain in the bleach a sufficient length of time to get a good white on the tops, heels and toes, the artificial silk becomes tender. (3735)

Without being acquainted with the general details of the process for bleaching that you are now using, we cannot offer suggestions for its improvement. On the other hand, it is suggested that you try the following, first with a small batch and then with experiments on a larger scale, always bearing in mind that artificial silk materially loses in strength when wet, and that the different varieties of artificial silk of commerce act differently towards the different bleaching agents.

Artificial silk is most commonly bleached with sodium hypochlorite, which may be prepared by the bleacher himself, or purchased. If made at the mill, two methods are in use, the electrolytic, and the chemical, the latter using bleaching powder and soda ash as the chief components. The latter is the method about to be considered.

One hundred pounds of bleaching powder are dissolved in 50 gallons of water and stirred until all the lumps have been broken up. In the meantime, 60 pounds of soda ash have been dissolved in 12½ gallons of water. These two solutions

are now mixed and stirred for a short time, and allowed to settle for about 12 hours, or over night. The clear liquor is drained off into a clean storage tank or vat, and diluted with water to stand at 6 degrees Tw. This is the stock-bleaching solution.

The goods containing artificial silk, together with cotton, are prepared for bleaching by suitably wetting-out, and are then immersed in the bleach solution, that has first been reduced with water so as to stand at 2½ degrees Tw. Immersion continues until the proper degree of bleach has been secured, which can only be ascertained by taking samples from time to time, examining carefully, and stopping the bleaching action at the proper time. When sufficiently bleached, the bleaching solution is drained off, and the goods then washed thoroughly with water, and finally passed through a weak bath of sodium bisulphite (about 1 pound to every 100 gallons of water), and rinsed well again.

Handling of the goods should be reduced to a minimum by using rotary machines in which the bleaching and washing can be done in the same compartment. Open kettles are not at all suitable, since the work of keeping the goods in motion seriously affects the condition of the artificial silk, and contributes to its weakness.

Yellowing after bleaching of artificial silk is not to be attributed to the bleaching process, but is indicative of poor washing after the bleach, and is generally the result of trying to get through too large batches in too short a time. Peroxide of sodium is also used for bleaching this kind of goods, and particulars of this process may be obtained from dealers in this product.

Processes of Weighting Silk

We are interested in finding out the various processes of weighting silk. We understand the old method is no longer in use, but that a new and more satisfactory formula is common. Kindly favor us with the various formulæ. (3691)

This is a big question and it would require a book to answer it fully. Does the enquirer refer to skein dyes or piece dyes, to blacks or colors, to tin weighting or gall weighting? Then there are endless variations in the treatments according to the particular purpose for which the silk is required, so that we have special blacks, double dyes, triple

dyes, tailoring dyes, umbrella dyes, velvet dyes, hat-band dyes, to say nothing of whether the silk is bright or souple, etc., etc.

Silk weighting is not a matter of formulæ; it is an intricate and critical chemical art, and unless the owner of the silk wishes to invite its destruction, it should never be submitted for treatment to anyone but the most experienced, careful and responsible dyeing concern that he can find.

If what the enquirer refers to is the most usual form of weighting, that is, tin weighting, in colors, on skein silk completely boiled off, it may be said that while improvements have been made in the mechanics of the art, that is, in the matter of handling the material, through the various treatments (and some developments also in the boiling-off methods), the general practice remains what it has been. In this the boiled-off silk is subjected to alternate baths of chloride of tin, and phosphate of soda, with thorough washings in between. In each of these "passes" through the tin it takes on an increase of weight, and after the last phosphate of soda bath, it then is treated to a bath of silicate of soda, which assists in fixing the weighting firmly upon the fiber and also adds somewhat to the weight itself. After the final washings the silk is colored, dried, and after "finishing" is put up in skeins again and returned to the mill.

Wrinkles in Worsted Goods

What causes wrinkles in worsted pieces? In dyeing we have overflows on, and the dye kettles are always full of liquor. (3743)

This question is put in very few words, but volumes could be written in answer to it, and even then the remedy might not be given. There are so many causes of wrinkles in worsteds that unless a man is on the spot and can see the goods and their treatment in the various processes of wet finishing and dyeing, he cannot be sure of giving the advice most needed. However, a general discussion of the causes and elimination of wrinkles may be of some assistance to the enquirer.

Wrinkles are the bane of finishers and dyers, especially if the product of the mill consists of tightly woven worsted serges, or fancy weave piece dye worsteds. The very nature of the fabric causes them to crack, break or wrinkle in the processes of scouring and dyeing; or if they are unfinished

worsteds, in the fulling.

The tendency of the designer of these fabrics is to crowd as many ends and picks into the square inch as the loom can put in. When trouble arises in the finishing and dyeing from this overcrowding, and the overseers of these two departments are ready to fly at each other's throats, it is well to call in the designer and ask him to consider the cloth construction and its influence in the matter. If the designer will let up a little on the number of threads and picks, he will be letting up on everybody. The weaver will produce better cloth, the fixer will not be so busy using up supplies, the mending cost will be cut perhaps 100 per cent., and a better feeling will prevail in the office and throughout the plant.

Let the designer lay the fabric two inches wider in the loom, and subtract two picks from each inch, and the reformation will be wonderful. If he is sceptical about the results, let him be open minded enough to try a few pieces this way. The fabric will look every bit as fine and close, and feel much softer when finished, and the wrinkles will in many cases disappear.

So much for preventing wrinkles. We will now consider the finishing of goods that have a strong tendency to wrinkle. If the fabric is very stiff, either from tight weaving or from coarse stock, and the finish is to be clear, twenty to thirty minutes run in the fulling mill first will help to break up and soften it, so that the after-processes of scouring and dyeing will be made easier. The pieces should be run with just a little more moisture than for regular fulling. Whether they are fulled in this way or not, they should be scoured in a heavy bodied soap, and not too strong in alkali, and run at least 45 minutes in soap. Rinse for one hour in warm water, not over 120° F., with a good supply of water in the bottom of the washer all the time. Then rinse for 30 minutes in cold water.

The goods should now be opened to full width and run through a continuous crabbing machine, with 3 tanks at the boil and one cold water; or put on rolls through a wet rolling machine at 170° F. and allowed to stand on end over night.

The dye kettle should not be overcrowded, as this is one of the many causes of wrinkles. If a ten-piece set is coming wrinkled, try eight pieces. If the mill has a two-bowl crabbing machine, the goods may be crabbed in the grease to advantage. This process also eliminates any tendency to

cockle, if done properly. The goods should be run on at a boil, with the top roll down, and allowed to run a minute or two after the pieces are all on the roll.

The overflow on a dye kettle may be a good idea when cooling off, but where does the good dyestuff go if overflowing all the time?

Pieces that are finished and show wrinkles may be made merchantable by boiling out in Glauber salt in the kettle for an hour, about two pailfuls to each piece, then extracted, dry rolled, and left on roll over night before drying. Wrinkles can also be removed by rescouring, with two men standing in front of the washer and opening the pieces out as they come over the doffing roll, giving them a good shake to make sure the folds change their position. If this is done while they are in the soap it helps greatly. After scouring, the pieces may be wet rolled at 125° F.

A mill man sends the following on this problem:

Wrinkles in worsted goods are generally formed in the fulling mills, produced by the combination of the tension and pressure upon the cloth, and are likely to be rendered more noticeable and permanent by the boiling in the dyeing process. Worsteds are more likely to be thus affected than other goods made of wool, because of the character of the stock and the close construction, as compared with the more soft and pliable character of the woolen cloths. The wrinkles in the worsted, under pressure, become more readily set, and hold their position, while those in the wool cloth work out by a more constant changing in the fulling process.

To minimize the trouble, the tension produced by tubes, stretchers and guide rolls should be reduced and excessive pressure of the main rolls in fulling should be avoided. Guides in the front of the mill should be wide, to give the cloth ample room to open out at this point. A good body of soap is also desirable to give a good cushion effect in fulling. Crowding or overloading in the dyeing should be avoided.

Stretch in Finishing Lawn

We are desirous of learning the percentage of actual stretch or gain in bleaching combed lawn, 40 inches, 88 x 80,—8.50 gray, manufactured by reliable eastern manufacturers, the width and finish approximating the sample attached. As opposed to the above, we desire to know the trade practice of reputable bleacheries as to the actual yardage returned under

the same conditions. We understand that the same count and weight of the same size yarns and practically the same length staple of the same grade of cotton, shows variable results even when bleached by the same bleachery and same finish. It is the accepted and known average percentage that we desire to know. (3732)

The finished sample is approximately 40 inches wide. A bleachery would probably require a working loss of 1 to 2 per cent. to finish the goods to this width. We do not believe any finishing plant can handle it on a working loss of less than 1 per cent., whereas they would probably not require more than 2 per cent. The reason for this is that the finished width approximates closely the gray width, and there would be no gain in length, whereas there would be a slight loss in headings which would have to be cut off. It would be impossible to make any appreciable gain in finishing these goods unless the finished width were 1 to 1½ inches narrower than the gray width.

In the matter of variable results as regards stretch in bleaching and finishing goods made from the same count of yarns, and practically the same length of staple and grade of cotton, would say that such variations do occur and sometimes are unaccountable. It is a fact that goods woven on different makes of looms may give slightly different results. The treatment of the cotton before it is manufactured, that is, as regards the conditions under which it has been stored, has been shown to give some variation. Then it is also true that the treatment of the goods in the cloth rooms of the gray goods mills also affects results as regards stretch in the finishing plant. For example, where the goods are brushed in the gray goods mill before shipping to the bleacher they may be slightly stretched, which affects the results in the finishing plant.

Preventing Tendering of Dyed Hosiery

We manufacture half hose, in the body of which is used combed peeler yarn and one-strand Japan silk. We want to dye these goods using sulphur black, so as to dye the cotton and leave the silk undyed, making a mottled effect. We then want to cross dye these same goods with an acid color, using 4 per cent. acetic acid to throw the color on the silk and topping off with 1 per cent. sulphuric acid. We should have explained that before cross dyeing, the goods are thoroughly

washed, and we would like to know if any chemical reaction occurs to tender the goods because of being passed through the above process. We are enclosing herewith sample of the goods dyed in the sulphur black bath, and also sample showing the cross dyeing. (3736)

Tendering of these goods may be prevented by passing the material after the final dyeing with acid colors, through a bath of water containing a small quantity of formate of soda, or acetate of soda. As a rule, about 3 pounds of either of these two chemicals to 100 gallons of water will be found sufficient. Without after-treating with some such chemical as above mentioned, there is a possibility that remaining traces of sulphuric acid in the goods might react upon the cotton and cause serious tendering. When after-treated with a formate or acetate of soda, should there be present traces of a mineral acid, such as sulphuric, an immediate decomposition of the acetate (or formate) occurs, with a neutralization of the mineral acid, and liberation of the organic acid, which is not injurious to cotton. Such organic salts of soda are always added to the last wash water.

Stitches to the Inch

We are making half hose on 160-needle machines, using 12s yarn. Kindly let me know how many stitches there should be to the inch. (3745)

The hose should have not less than 18 needles and not more than 20 needles to the inch, the measurement to be taken the day after the socks have been dyed and dried, as this is the condition in which they are sold.

Continuous Dyeing Machine for Felt Goods

We are in the market for a dyeing machine that will take a piece of 30-ounce cloth, 60 inches wide, in cuts up to 60 yards, these to be run through full width from a roll or truck and to lie out smooth while in the dyeing machine and then pass through a rinsing tank or box onto a roll or truck. Our dyer calls the machine a two-compartment dyeing machine. Perhaps you can suggest something for our purpose. (3717)

The type of machine suggested by your dyer is excellent for the purpose. These machines are called "continuous dyeing

machines," and have spreaders to keep the goods full widtl and free from wrinkles. They are also made with more tha two compartments, depending upon the class of dyeing to b done, and are provided with upper and lower immersio rollers besides squeeze rollers between each compartment, i desired. Of course the compartments may have a heatin coil, should it be necessary.

Wavy Effect in Finishing Cotton Goods

Enclosed find a piece of gingham. You will notice that th general appearance of this piece is wavy. We are also havin this trouble with zephyr. These goods are run from the siz box onto dry cans, then into the tenter. After that they ar given a heavy calendering with a 3-husk and 2-steel ro calender. I would like to know what part of this operatio would be most likely to cause the trouble, and what can b done to remedy it. I would also be glad of any informatio you can give me regarding the care and upkeep of both tenter and calenders. (3738)

The trouble the enquirer is having with this wavy effec may be caused by the crimp bars in front of some of hi machines. Or at the tenter frame where the goods pass fron the size box to the cans, either too much tension is used a the goods enter the size box, or there is too much heat on th dry cans that sets the waviness in the goods before they ar tentered. If this latter is the cause nothing will remove i except passing the goods over the tenter frame again and wet ting them out. It appears that too much heat is used on th cans before the cloth passes over the tenter frame. Th enquirer does not state whether he uses the jig motion fo these goods. If so it ought to eliminate this wavy effect.

The enquirer should be able to trace the trouble if he wil watch the goods after each process, and find out where th wavy effect appears. If it is not in the goods from the mangle watch and see if it is in the cloth after the goods are drie before tentering; or if it appears after being tentered.

Do not use any steam in the cans between the size box and the tenter frame, and watch the effect. If the trouble is no located here, watch the other machines, and particularly th tension at each machine, as there is apparently too much tension used somewhere, or too much drag.

As regards the care and upkeep of tenter frames and

calenders, with the tenter frames great care should be taken of the clips and slides, especially after each week-end when the frame is cold. Go into the frame and examine each clip to see if there are any stiff clips. If there are, use a little oil and make them work easily. Keep the slides clean, also the driving wheels and pulleys at each end of the frame. Care must also be taken of the lifting plates at each end of the machine to see that they do not wear the clips too much.

In regard to calenders, be careful to see that the weight is put on evenly, as uneven weight wears down the rolls unevenly. After using for some time have the ends of the husk or cotton rolls scraped off so that the pressure of the machine will be on the cloth and not on the ends of the roll. This ought to be done about every two months.

Particulars of Tire Fabrics

Kindly advise us which yarn should be the stronger in a woven piece of tire fabric: the warp, or the filling. Does your answer apply to all kinds of goods? Also, what should the average contraction of the warp and filling be, and what is a fair stretch to allow during frictioning? We are enclosing a sample of our fabric, and would like to have you tell us what the different twists are in the selvage, and what are the advantages of using right and left-hand twists in the same strand of yarn. Will you also advise us at what temperature this cloth should be dried to find the moisture? (3750)

In the first question the writer assumes that the enquirer is referring to the breaking strength of the fabric. The filling will always be found to be the stronger. In every case where the tests have been made at a certain research bureau of national reputation, the filling was found to be the stronger. The average contraction will depend wholly upon the kind of yarn being used, but striking an average of four different kinds, the contraction was found to be 16 per cent. for warp and 10 per cent. for filling. To secure 100 yards of fabric, you must have 116 yards of warp yarn; a 60-inch fabric will be 66 inches in the reed.

As to what a fair stretch would be during frictioning, it would depend wholly on the local conditions, each mill having conditions to meet that are different from other mills. Therefore, one would have to know the conditions before replying.

The advantages of using a right and left hand twist in the selvage yarn is that it makes a stronger and firmer strand of

yarn for the filling to pull against, and the result is a firme and finer finished piece of cloth. Another advantage is tha the selvage lies flat and does not curl up. The first twist i the sample is regular, the second twist is regular, the singl yarn is a reverse twist.

The temperature at which to dry out the moisture is tw hours at 100° Centigrade, or 212° Fehrenheit in an electri oven. Tests in an electric vacuum oven are being made at th present time, and the same results can be secured at 50 Centigrade and 105° Fahrenheit.

A mill man replies as follows: Tire duck must be as equa as possible in strength, both warp and filling way. The fillin runs into the cloth without any friction, while the warp i subject to the friction of the harnesses and reed. But th beating up of the filling weakens it to some extent, so tha sley and pick being equal (which is usually the case in tir duck), the breaking strength of the cloth should be nearl equal both ways. This answer does not apply to all kinds o goods. It only applies to fabrics that are woven for specia purposes, such as tire duck, airplane fabrics, gas mask cloths etc.

There is no hard and fast rule governing contraction, eithe in warp or filling. The contraction in the warp is governe by the tension on the warp while weaving and the strengt of the filling. If the warp is run slack, it will bend around th filling; if the warp is run tight it will bury itself more or les in the filling, particularly if the filling is of a soft nature Apart from the tension or friction in the shuttles, the fillin goes in the cloth free. If the filling is very strong and har (as in the sample submitted) the warp will not make muc impression on it. The best way to determine the contractio is to weave a yard with an average tension. Then proceed a follows:

Cut any number of inches from the cloth (preferably 1 inches, but any smaller amount will do); take out a thread o warp, wet it to take out all crimp, and then measure th thread; subtract cloth length from thread length, and calcu late the contraction.

To get contraction of filling, measure the width of warp in the reed, then measure the woven cloth, subtract cloth width from reed width and calculate the contraction.

The sample submitted has contracted about 15¼ per cent. in the warp, and about 6 per cent. in the filling.

It must not be inferred that the warp, being under greater strain and tension in weaving, will be weaker in the cloth, for while the filling is not under much strain when leaving the shuttle, the action of the reed while beating in the pick has a tendency to weaken the filling fibers.

Stains from Metal Brush Roll

If you can offer a remedy for the trouble mentioned in the question underneath I will certainly be very much obliged and would appreciate a prompt reply, as we are greatly annoyed by this trouble at the present time. We make men's winter underwear and bleach with sulphur. After bleaching and drying, some of our lines are passed through a garment brush which is covered with fancy wire. On the tips of the skirts or cuffs, or wherever the goods, after passing through the feed rolls, rub up a little closer to the brush, there appears a black stain, similar to that shown on clipping enclosed, although, of course, not quite so deep. The stain on this clipping was made by holding a piece of cloth firmly against the brush. We have cleaned the brush thoroughly by rubbing, but still the stains appear. Can you explain these and advise how to overcome them? (3728)

The actual stain upon the sample submitted consists chiefly of iron and machine dirt. Since the stain shows most prominently where the goods rub against a brush, it might be desirable to clean the brush free of all loosely adhering dirt by giving it a thorough washing with gasoline, or a cleaner like Oakite. Such treatment will dissolve all machine oil and at the same time loosen and remove all or nearly all machine dirt. In the present sample, proof that the stain is due to iron was determined by dissolving the stain in pure acid, and making the usual test for that metal.

Humidification in Knitting Mills

In our various plants we have had considerable shrinkage in our worsted, woolen and cotton yarns drying out in process of winding and knitting, and we would appreciate it very much if you would let us have your views regarding the advisability of installing a humidifying system in our winding and knitting departments. We do not sell our goods by weight, but it has been argued by some of our men that if yarn contains less moisture than the recognized standard, it will not produce the same number of dozens as yarn containing say 15 per

cent. moisture. Is this a fact? Which worsted yarn would have the most yardage to the ounce or pound, yarn containing say 15 per cent. moisture, or yarn containing say 5 per cent.? (3764)

The knitting mills have undoubtedly been more backward in the matter of the installation of humidifying systems than have other classes of textile mills. Such systems have, however, been installed in numerous sweater, hosiery and underwear plants using cotton, silk and wool, and we have yet to hear of a concern which has regretted such a move.

The enquirer states that he does not sell his goods by weight, but he neglects to say whether his customers specify or expect his goods to have a standard weight per unit or per garment, or whether there shall be a certain number of units or garments per pound, which amounts to the same thing. If such is the case he is, in the last analysis, selling by weight, although nominally the price named may apply to a piece or a garment. Woven cotton cloth is ordinarily sold for a certain price per yard, but the customer usually specifies that there shall be a certain number of yards to the pound. If such a mill is being paid 40 cents per yard for goods expected to run 5 yards to the pound, it is being paid $2 per pound for its goods. Now if there should be more than 5 yards to the pound the customer will complain that the goods are under weight, while if there are less than 5 yards to the pound, the producer is still receiving $2 for the 5 yards, but is delivering more than a pound of material for this price. It is therefore obvious that he is at such a time giving away some material.

In regard to the yardage per pound of yarn containing 15 per cent. and later 5 per cent. of moisture, let us assume that the enquirer has purchased 100 pounds of 12s worsted yarn, containing on delivery 15 per cent. of moisture. He would have 6,720 yards of yarn in the lot. Now assume that the yarn dries out to the point where it contains but 5 per cent. of moisture. He originally had 85 pounds of absolutely dry worsted yarn, and 15 pounds of water in the lot. He now has the original amount of worsted and about 4½ pounds of water. Ten and one-half pounds of very high-priced water has evaporated. The length of the yarn is still the same, however, and the yardage per pound is greater, since there are fewer pounds. There are now about 7,500 yards to the pound instead of 6,720 and the yarn number is now about 13½s. The original lot of yarn will still suffice to produce the same

number of garments as formerly, since its length is the same, but the total weight of the garments made will be about 10 per cent. less than as if the original amount of moisture had been retained.

If the customer should complain that the garments are running lighter than formerly, the producer must take measures either to retain a moisture content of 15 per cent. in his yarn, or to replace the moisture loss by weight of worsted by the use of a heavier yarn. If, however, the reduced weight of the goods occasions no protest, the most profitable course to follow would be to purchase a lighter yarn, retain the 15 per cent. of moisture purchased, produce a 10 per cent. lighter garment and thus produce 10 per cent. more garments from the same weight of yarn. Whatever the selling conditions, the fact is evident that when 10 pounds of raw material out of every 100 pounds purchased evaporates before it can be sold, we are throwing away 10 per cent. of the money spent for raw material.

This condition can be remedied without installing humidifiers throughout the plant. Many mills restore the normal amount of moisture to their goods just before packing by allowing them to remain for a day or so in a damp room known as a conditioning room. This room may be kept damp by humidifiers, or even by steam jets using only nominal pressure of steam. In come cases conditioning rooms are moistened by causing water to trickle down the walls from perforated pipes.

Aside from the question of passing on the normal moisture content to the purchaser, there are other considerations which make desirable the use of artificial humidification. It is a proved fact that yarns of whatever material have a certain standard percentage of moisture content—the percentage, of course, depending on the character of the fiber used—at which the tensile strength of the yarn will be at its maximum. Consequently if the yarn contains the desirable amount of moisture when processed, the amount of breakage will be less than under other conditions. In the knitting mill this means fewer knots, fewer holes in the fabric, and fewer broken needles.

Again, the textile fiber of whatever kind is very susceptible to static electricity, which is always present around moving parts of machinery. When charged with static electricity, the fibers have a mutual repulsion for one another, which tends

to make the yarn furry and spongy with fibers protruding in all directions. When processed such yarn tends to bunch up and tangle and form slugs. The loose protruding fibers become detached, lint and fly accumulate, and the amount of waste and breakage is accordingly increased. At the same time the material tends to adhere to the metal parts of the machines, which further tends to make manipulation difficult. The difficulties arising from the presence of static electricity are largely eliminated by the maintenance of a proper amount of humidity in the atmosphere.

The amount of dust, which is always present to greater or less extent in the atmosphere of any textile mill, is considerably reduced by a sufficient moistening of the air. This, of course, tends to produce greater comfort and contentment among the operatives, and reduces waste and bad work.

Machinery for Narrow Fabrics

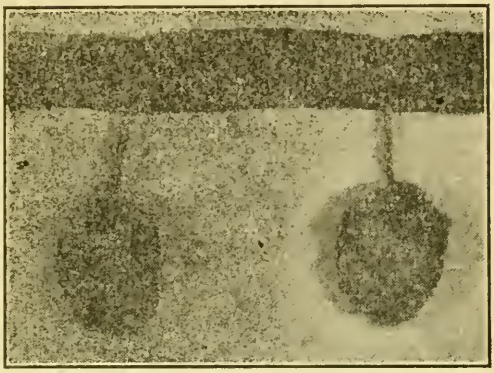
Will you please give me information on, and let me know, where I can buy machinery for making braids like the enclosed sample? (3713)

The samples are shown in the accompanying illustrations and are not braids but are narrow woven goods. There is no question about their being made on looms. The white sample is made on a narrow jacquard loom. The extending loops at the heading and footing of the design are made by a series of wires over which the white cord works, and which act as a temporary filling. These wires extend a short distance beyond the weaving point, and the cord simply slips off the wires, leaving the loops as seen in the design. No weaver should have an difficulty in making this pattern.

With the green sample any weaver would experience some difficulty if he were to try to make the entire pattern on the loom. The warp is threaded similar to the white sample and the green filling cord is woven back and forth for thirty shots; on the thirty-first shot across, the wire mentioned in connection with the white sample is used to hold a loop about 1½ inches long. The imitation chenille balls are then placed on by hand.

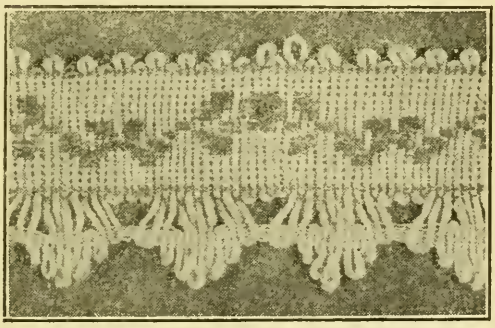
From a close inspection of the chenille balls it will be seen that they consist of a number of threads bound in the center, the binding thread passing through the extending loop of the filling. We have drawn out a number of the strands compos-

ing the ball in order to show the binding drawn through the extended loop. In order to obtain the ball effect the binding



CHENILLE BALL ATTACHED BY HAND

thread used must be very tightly drawn around the strands. Any builder of narrow fabric looms can supply the looms required for the manufacture of both samples.



FABRIC MADE ON NARROW JACQUARD LOOM

Cord Tire Fabric Construction

Will you send me the construction of cord tire fabric? (3746)

In a cord fabric made by one prominent mill, the regular 23-5-3 yarn is used. This is made mostly from combed Egyptian and Sea Island cotton, and the first twist is on a wet

twister on to a 3-inch spool, reverse twist, 7½ turns to the inch. The last twist is dry, regular twist, 3.75 turns per inch. The yarn is then taken to the direct beamer or to the creel at the back of the loom. The fabric is removed from the loom and shipped direct to the buyer or rubber factory. The construction below is standard and is used in one of the largest mills in the country.

Width, 60 inches.
Weight, 13.95 ounces per square yard.
Warp, 23-5-3 combed S. I. or Egypt.
Filling, 20-1 American.
Sley, 26.
Picks, 2¾ per inch.
Ends, 1,560.
Reed, 7.25.
Reed space, 64 inches.

Processes in Weaving Tire Fabric

We have a large output of tire-fabric yarns, and would like to know how they are prepared for the cloth by the weaving mill. Also what finishing is done on the cloth. (3747)

The various processes tire fabric yarn goes through from beams to finished fabric are as follows: The yarn is twisted direct from beams to spools, using a 4-inch or larger spool (a 4-inch spool holding about 2,300 yards of 23/11 yarn is common). The yarn runs from the beam through a comb or rod attached to the beam stand, the rod having eye hooks placed evenly apart. The purpose of the comb or rod with eye hooks is to split the 11 ends to each spool into 5 and 6, this making it easier to handle and the yarn runs better.

The average twist on this 23/11 yarn is about 3.75 turns per inch. One Southern mill uses 3.85, but most of the Northern mills use about 3.75. Some mills use a combed Sea Island yarn for a selvage of 6 ends, making a better finished piece of goods, although the selvage is of no practical use and is being done away with in some places, as the edge of the fabric for one-half inch or more is cut away at the rubber factory. This selvage consists of 3 single ends of reverse twist, and then 3 of these twisted regular.

From the twisters the spools of yarn are taken to the direct beamer, and from there to the looms. From the looms, the

fabric is taken to the inspection tables, then to the burlers, where all loose ends are cut off, all bunches and knots removed, ends sewed in and oil spots removed. Then the fabric is taken to the brusher where it is thoroughly brushed. Then it is steamed and calendered, wrapped in paper and burlap and shipped.

Paper Textiles

Could you inform me if there are firms engaged in the manufacturer of a paper textile similar to that used by the Germans for clothing during the war? The paper cloth that I saw was made from thin strips of paper twisted, then woven similar to linen or burlap. (3765)

Paper yarns and fabrics are manufactured by such concerns as The Cleveland-Akron Bag Co., Cleveland, Ohio; Wortendyke Mfg. Co., Richmond, Va.; and the National Fiber Textile Co., Neenah, Wis. All these concerns make products which are too coarse for clothing fabrics. Their products are coarse yarns used for twines, etc., and cloth that is used in place of burlap or for rugs and mats.

There is no object in making fine cloths for clothing purposes. The Germans only did it under the difficulties due to the Allied blockade. We have seen samples of paper fabrics made in Japan that were superior to anything made by the Germans, we believe, but do not see how these could compete with goods made out of cotton, wool, linen or silk.

Figuring Costs in a Woolen Mill

Could you give an idea of how to figure the costs for a 7-set woolen mill on tweeds, homespuns, etc.? The yarns are 1⅜ run to 3 run. How would you figure each individual department, say, picking, carding, spinning, spooling, winding, dressing, drawing, weaving, finishing, dyeing, shipping and overhead expenses? Our cuts finish 50 yards long and are woven 50 yards; in other words, hold their length. (3790)

It is impossible to give the enquirer in a short reply the principles of cost control, but if he will refer to the issue of TEXTILE WORLD for February 28, 1920, he will find in Question and Answer 3740 an approved form of cost calculation. The form illustrated in that issue was designed for the operations commencing with the preparatory department for weaving. The cost calculations for spinning and weaving should always

be kept separate because in one fabric usually several batches and sizes of yarn are used. A spinning calculation should be developed in a similar manner, the difference being that on this calculation the items of selling, burden, freight, insurance, boxing, packing, discount and selling commission are not added because such cost items are figured only for the finished fabric.

The spinning calculation is generally divided into the following sections: dyeing, carding (which includes picking) and spinning.

Burden for each department should be figured separately. This includes all non-productive labor, cost of power, rent, insurance, depreciation and other items distinctly connected with the management of the department. The most approved form of burden distribution in a textile plant is based on productive labor.

Example: If the productive labor of a department is $5,000 for a period, and the non-productive labor, expenses, etc., making up the departmental burden is $2,500, the burden factor for this department will be 50 per cent., based on productive labor.

Therefore, if in the cost calculation the productive labor of that department for a unit of product is 38 cents, the departmental burden for that product will be 19 cents.

Modern cost control provides a set of control accounts which assist in the proper determination of the departmental burden and prevents the possibility of a plant accumulating manufacturing burden that has not been distributed over the product. Principles of these control accounts cannot be given in short articles but they may be obtained from books referring to this subject.

Waste in Worsted Drawing

Before I came here the mill had used nothing but kerosene emulsion in worsted drawing. I tried an emulsion made with 5 gallons of olive oil, 1 quart of ammonia and about 50 gallons of water. Could you give me some good recipe for making emulsion to use in the drawing department?

We are working on low grade stock, and the drawing which is on the Bradford system gives me a lot of trouble by the sliver going around the leather roll. In the spinning department the condition is still worse. The yarn is a very hard feeling stock, and is a very short staple. Normally I have

about 5 per cent. of waste, and on very dry days 8 to 11 per cent. of waste. With kerosene emulsion it made as much as 15 per cent. of waste under some of the best conditions. (3787)

A good emulsion for worsted drawing is made of

80 gals. water
20 gals. olive oil
6 ozs. borax

Boil all together and stir well before using.

This is to be used back of the first gill box in drawing. It is an advantage also to put a little water back of the 2-spindle gill box. Short, low grade stock needs more twist in drawing than high grade stock.

If the drawing boxes are suitable, the placing of an iron rod in front of the bottom compression roller (a rod similar to the one on a 2-spindle gill box), and setting it so that the slubbing will rub on the compression roller and pass under the rod, will generally stop roller lapping.

A worsted superintendent replies as follows: The trouble apparently is not in the drawing, for according to the question the stock sticks in the spinning as well as in the drawing, which shows that it is not scoured properly. If dirt and grease are left in the wool they will work out on the drawing and spinning rollers, and the stock will stick regardless of how much oil is put on it. With good scouring and the emulsion he is using, the enquirer should not experience such troubles as he is having.

Reason for Direction of Twist

Will you kindly answer why some manufacturers use right twist in making thread? (3744)

The effect of twist is primarily to give to the collection of fibers a certain strength and elasticity, and secondly to get a desired appearance or luster. The first is obtained by the number of turns to which the fibers are subjected. The second is derived from the number of turns and the direction in which they are inserted.

In a collection of fibers of uniform diameter and quantity, that is, of similar counts, the direction of twist will not, in the first twisting (single yarn) affect the appearance, the luster, the strength, or the elasticity, so long as the number of convolutions remains the same. If two similar collections

of fibers of uniform diameter and convolutions, but twisted in opposite directions, are placed side by side, there may be a perceptible difference in the appearance, but this is due to the different angles of refraction, which are made noticeable by juxaposition.

When filling yarns in a woven cloth are spun in a direction opposite to that of the warp, the filling will stand clear, the interlacing will be more apparent, and the design will be more distinct.

The effect of direction of twist is more evident in doubled or ply threads. If the single yarn is spun clockwise, the natural direction of the ply thread twist will be anti-clockwise. Without mechanical intervention, two single strands will tend to twist around each other in a direction contrary to the first inserted twist. If this twist is continued until the two strands are incorporated, the resulting two-fold yarn will be a perfectly laid thread. To make this clear, a single yarn spun clockwise will make the most perfect two-fold if retwisted anti-clockwise, and vice versa. In appearance, presuming always that the fibers, diameters and number of turns remain the same, neither of them can be discriminated if kept apart. If they are placed together (mixed) the difference is apparent at once, due to the varying angles of refraction.

Ply yarns twisted in a direction contrary to the previous twist results in a softer feeling and more pliable thread; the single ends are better embedded or incorporated. This arises from a certain amount of untwisting taking place in the individual strands during the retwisting.

If the strands are retwisted, after doubling, in the same direction as the original twist, the resulting thread will be harsh and wiry. This is due to the opposite twisting effect of the first instance. In this case twist is added to the original strands; they are tightened on themselves and on each other, do not "bed" so readily, and the result is a clearly defined spiral.

A manufacturer may change the direction of twist to obtain a certain appearance, a desired lay of the thread, and in multiple ply yarns, strength. Incidentally it can be done to reduce cost.

In single yarns, all other factors being equal, direction of twist will not affect strength or cost. In ply yarns (6-12-15 ply cabled, etc.) the diversity of methods of twisting is so intricate that every attribute of the finished product may be affected.

The above are the basic principles on which all yarns or threads should be produced. The large English manufacturers of sewing threads, cables and crochet yarn, who have been established for generations, still consider it necessary to conduct experiments on the effect of direction and amount of twist. Fabric manufacturers also, perhaps to a lesser degree, follow the same course.

Why a manufacturer uses a certain direction of twist is difficult to decide, except on the general principles stated.

Curl in Flat Goods

We are using a number of circular machines on which we manufacture worsted, half-wool and mercerized cotton cloth for the making of bathing suits, and we are having considerable trouble in our cutting and sewing-room because of the curling of these goods. We finish them by putting them into a live steam outfit, leaving the pieces in for about 90 minutes. We write you to ask if you would have some of your folks who are versed in matters of this kind favor us with information that would serve to eliminate some of the trouble we are encountering. (3789)

Edward Noon & Son, manufacturers of bathing and athletic suits, at 4017 Germantown Avenue, Philadelphia, get very satisfactory results finishing their worsted and mercerized bathing suits on a Curtis & Marble mangle in conjunction with a turning pipe and spreader from the Grand Rapids Textile Machinery Co. They use a jet of live steam through the turning pipe, and finishing between the hot rollers have no trouble. With anyone desiring further details they will be glad to go into the matter more in detail.

Number of Employes for Cotton Yarn Plant

Kindly advise us the entire number of employes needed, including overseers and superintendent, to operate a small cotton yarn spinning plant of about 4,000 spindles and 28 revolving flat cards. The machinery is all Saco-Lowell make and consists of openers, beaters, cards, intermediates and spinning frames. This plant is to make 8/1 and 12/1 yarns and is to be run in connection with a large manufacturing plant. (3771)

The information provided is indefinite, but we presume the enquirer intends to employ two roving processes and spin

from single intermediate roving, which would be entirely feasible in manufacturing yarns of these numbers.

For a mill of this size one picker hand and two card strippers should be sufficient. A card grinder would be required, and arrangement should be made for him to keep the pickers and drawing frames in repair. The roving machinery for a mill of this size would require but one slubber tender and one intermediate tender.

Spinners and doffers can handle but few sides on yarns of this nature. There would probably be required five spinners and two doffers in the spinning-room. A third hand of spinning could be kept busy keeping the frames in repair, hoisting roving, cleaning bobbins, etc. Two sweepers would be ample for the whole mill, and they would have time to carry out waste, brush down shafting, etc. The supervision of the plant could well be taken care of by a superintendent, one overseer and one second hand. The latter would include in his duties the care of the slubber and intermediates.

Presumably we should also require one teamer, one watchman, one yard man and one man to attend to packing and shipping. As no mention has been made of the power plant or the office, we presume that these are taken care of by the large manufacturing plant referred to in the question.

Neglecting the office, power plant, and repair shop, the total number of employes would accordingly be about 23. This figure can only be approximate as we would require considerably more detail to be positive in the matter.

Weak Cotton Yarn from Mildew

We are sending you a sample of cotton yarn, 10/5 ply, and you will note that the dark places of the yarn are very weak. We would like to know if you can determine what has occurred to the yarn. (3780)

The yarn has a faint odor of mildew and the spots have the general appearance of mold. A microscopic examination would determine this beyond doubt. Such a condition would result from the presence of water, whether the yarn had been sized or not, but is, of course, more likely to occur on sized yarns. If the condition is very prevalent, the remedy is to maintain dryer storage conditions. An ounce or two of formaldehyde in each bale will prevent further mold growth without harming the yarn in the least.

Finishing Cotton Tape

Can you tell us what the enclosed samples of cotton tape are finished with? What finishing machinery would be required to finish same; also a few names of manufacturers of these machines. (3778)

The samples submitted are evidently finished with a solution of bone size, glucose, salts and corn starch. As regards the coloring of the samples, it seems as though the color was mixed in with the sizing solution. It is possible that the goods are dyed before sizing.

There would be required a mangle to take the necessary widths of tape to be finished at one time, as these lines are generally run in 20 or 30 widths on one roll according to the method of manufacturing, and the machine would have to be wide enough to take in the number of widths on the roll. Drying machinery would be needed to dry up the material after sizing. If these goods are manufactured in the gray, and have to be dyed, this would have to be taken into consideration. But for the finishing the above is all that would be required besides the tubs for mixing up the sizing solution. Full information on machinery could be obtained from any of the advertisers in TEXTILE WORLD who make this class of equipment.

For a base to work from for the sizing solution try

75 lbs. bone size
50 lbs. glucose
50 lbs. Epsom salts
50 lbs. corn starch

Use enough water to make this into 100 gallons and boil for 2 minutes. Add coloring matter if necessary, to have the goods the same color as sample submitted.

If this does not make the goods stiff enough, increase the ingredients proportionately until the desired result is secured. Pass the goods through this solution and dry up on the drying machinery.

Yards in a Pound of Yarn

How many yards are there in 1 pound of cotton, worsted or wool yarn? (3781)

The number of yards in 1 pound of cotton, worsted or other

yarn depends on the fineness or number of the yarn. In a No. 1 cotton yarn there are 840 yards to the pound. In a No. 1 worsted there are 560 yards to 1 pound. In wool, there are 1,600 yards to 1 pound of 1-run yarn.

In a No. 10 cotton, there are 10x840 yards in 1 pound. In a No. 10 worsted there are 10x560 yards in 1 pound. In a 5-run wool there are 5x1,600 yards in 1 pound. In other words, the number of yards in 1 pound is the product of the yarn multiplied by the standard (840 for cotton, 560 for worsted, 1,600 for wool) for the material.

We would recommend that you purchase a good book on yarn calculations, which will make this clearer and also explain other systems used in some sections of the industry and in other countries. A complete catalog of textile books can be obtained without cost on request to the Book Department of TEXTILE WORLD.

Speeds and Settings for Worsted Machinery

Kindly give me, if possible, the speeds of the following machines that are required for open drawing, the Bradford system, to draw stock to be spun to 10 to 20 counts, worsted

1 single can gill box,
1 double can gill box,
1 two-spindle gill box,
1 four-spindle drawing box,
1 four-spindle weigh box,
1 six-spindle drawing box,
2 six-spindle finishers,
2 thirty-two spindle reducers,
7 thirty-two spindle rovers. (3770)

The following speeds should prove satisfactory: Single can gill box, 220 fallers drop per minute; double can gill box, 220 fallers drop per minute; 2-spindle gill box, 220 fallers drop per minute; 4-spindle drawing box, 160 revolutions of spindle per minute; 4-spindle weigh box, 180 revolutions of spindle per minute; 6-spindle drawing box, 200 revolutions of spindle per minute; 6-spindle finishers, 230 revolutions of spindle per minute; 32-spindle reducers, 1,000 revolutions of spindle per minute; 32-spindle rovers, 1,200 revolutions of spindle per minute.

The above speeds are calculated so that each box delivers the amount required to keep the following process supplied. If, owing to variations in draft, any of the processes overrun

others, the number of fallers dropping, or revolutions of spindles per minute must be increased or decreased by altering either pulleys or gears, as the case may be. This, of course, makes no difference to the relative speeds, or drafts between rollers and fallers, and rollers and spindle.

A good plan is to let the weigh box have a slight lead in speed so that if a sliver is not coming off at the exact weight required, less time is lost in making up a set for the following box or boxes.

Knitting Hard Worsted Yarn

Enclosed please find piece of spring needle cloth with which we are having a great deal of trouble. You will notice that it is a pure worsted article and the yarn seems to be so wiry that it continually slips from the beard of the needle, thus causing us a great deal of trouble. Any advice you could give on making this fabric, we would be pleased to receive.

(3785)

A knitter replies to this question as follows: The sample appears to have been knit from dry or nearly dry yarn. Our practice has been to wind such yarn over a roll running slowly in a trough of olive oil emulsion. This treatment and allowing the yarn to stand in a moist atmosphere for 24 hours in order that it shall become evenly dampened should cure the trouble. If it does not; it may be necessary to take out 2 or 3 turns per inch from the twist of the yarn. The moistening should make for a much more even stitch.

A good method of oiling is that of running the yarn over a roll which revolves slowly in a trough containing emulsion. The speed of the roll as related to the linear speed of the yarn, the size of the roll, the length of the yarn in contact with the roll, and also the height of emulsion in the trough are all determining factors as regards the moistening of the yarn.

The proper conditioning of the yarn is very important and the amount of moisture to be used should be determined by careful experiments. Undoubtedly one of the reasons why American-made goods do not have the soft finish of imported fabrics is because we do not often soften our yarns before knitting. No amount of labor in finishing will ever even the length of stitches which have been unevenly drawn in knitting.

Another knitter sends the following: I cannot tell how to run the enclosed worsted yarn. There are several ways of

trying to run it. Last year I ran a hard twist 26 worsted over paraffin with more or less success. We also used an oil emulsion with fair success. I would suggest trying an emulsion of soap and olive oil on a few bobbins. Emulsion can be sprayed on full bobbins for a test. I won't guarantee this but on certain worsteds it will help.

Red Stains on Dyed Hosiery

We are enclosing herewith a stocking dyed with sulphur black which shows splotches of red on the fabric. We have done all that we know to eliminate this trouble, but up to the present time have been unsuccessful. The machine is an iron drum divided into pockets. We have two sulphur black machines, but do not have any trouble on the other machine. We have tried increasing the amount of sulphide in solution, also tried different methods of entering goods into the bath, but this does not seem to help. Please advise us what you think causes the trouble. (3742)

Judging from the sample stocking submitted, the trouble appears to be due to a lack of proper circulation of the dye liquor through the mass of stockings in the machine which this one comes from. There is usually less trouble with a dyeing machine, as such, than with the make-up of the dye solution, and its volume in relation to the weight of material to be dyed, and these factors have a decided influence upon the result desired. From the appearance of the sample, it seems that the dye solution is too concentrated, and that the stockings have not been uniformly packed in the compartment of the machine, with the result that "leads" exist; these leads or channels forming avenues of least resistance for the dye liquor, and in consequence, the cotton at such places takes up more dye than in those places where it is more closely and evenly packed. Indeed, much of the ground for complaints of uneven dyeing, when the dyeing is done in machines, is due directly to unevenness in placing the goods to be dyed in the machine compartments.

Dyeing and Finishing Mohair Plushes

Will you send me information on the processes of dyeing and finishing mohair plushes? (3792)

Plushes of this character are dyed in the piece, in some

instances with white cotton backs, and in others with colored backs. As a rule, the colors made use of for cotton backs are few, usually blue, red and brown, but others are sometimes required. Since the mohair pile is dyed in an acid bath, the problem of plush dyeing is a cross-dyeing one, and the dyes on the cotton backs must stand the operation. Formerly indigo, turkey red and cutch were used, but afterwards the sulphur blues and browns and primuline replaced those mentioned in a most satisfactory manner. The dyes for the mohair or wool part of the plush are selected from those that, when dyed in an acid bath, do not stain the cotton.

Dyeing is usually done in open rectangular tubs, attached to each being a winch for the purpose of keeping the plush in motion. The goods are always dyed full width. The whizzer is of the horizontal type, this kind being necessary to protect the pile.

Finishing consists of drying, brushing shearing, brushing, batting (raising the pile), and in some cases sizing the backs, or only sizing the selvages.

Particulars of Plush Back Knitted Cloth

We enclose sample of a knitted fabric which upon examination we judge to be made with two threads of yarn in jersey stitch. Will you kindly give us information regarding the necessary equipment for this and the approximate size of the yarn to produce 26-ounce cloth? We believe this is made about 7 needles to the inch on 35-inch cylinder, and would like to know also if it is possible to produce it on a 30-inch cylinder and have the goods finish full 54 inches. (3796)

The sample in question was made on a spring needle machine of about 10-gauge and 35-inch cylinder to get at 54-inch cloth. It is made from two threads of wool yarn, about single 20-cut, or 6,000 yards to the pound, and is constructed the same as the old cotton back or fleece-lined underwear with a green mixture used as the face and a blue or purple mix as the backing. The weight is approximately 26 ounces.

To get the width on a 30-inch machine, the machine would have to be about 12-gauge, and while it would be possible to knit it on this gauge, it would not work as well as on the 10-gauge. It should be noted that gauge is not needles per inch. Ten-gauge is about 6⅝ needles per inch, and 12-gauge is 8 needles per inch.

Calculating Cost of Hosiery "Seconds"

Knowing the average percentage of seconds in our production and the selling price of same, we wish to get some method of figuring the percentage of loss on seconds by which we could charge a stated amount per dozen for seconds in our manufacturing costs. (3791)

The amount to be added to offset the loss caused by the depreciation in the value of the seconds is obtained as shown in illustration below:

Total production for the period in dozens.....	35,755
Average manufacturing cost per dozen.....	$7.55
Total manufacturing value.....	$271,050.25
Percentage production of seconds.....	3%
Quantity production of seconds in dozens.....	1,073
Average selling price of seconds in dozens.....	$3.50
Total sales value of seconds.....	$3,379.95
Manufacturing loss on seconds: (7.55—3.15x 1073).....	$4,721.20
Percentage factor to be added to the cost of each dozen (4,721.00x100 divided by 271,050.25).....	2.175%
Amount to be added to the manufacturing cost for the loss of seconds to each dozen.....	0.1642
Manufacturing cost including share of loss on seconds per dozen.....	7.7142

Such calculations should be made for each grade of stock manufactured.

Bleaching Linen Toweling

We are desirous of obtaining a formula for bleaching linen toweling woven in the gray; also would like to know whether the same process would be adapted for bleaching airplane cloth. Could you suggest something for this purpose? (3799)

The process of bleaching towels made from gray linen yarns, as done in one of the large linen bleacheries, is as follows:

First, the goods are boiled in 10 per cent. of slaked lime for 8 hours.

Second, soured in muriatic acid at 2½ degrees Tw.

Third, boiled for 6 hours in 3 per cent. soda ash and 1½ per cent. caustic.

Fourth, boiled 8 hours in 1½ per cent. caustic.

Fifth, chemicked in chloride of lime at 66 degrees Tw.

Sixth, scalded in boiling water for 3 hours in 3 per cent. soda ash and ¼ per cent. soap.

Seventh, chemicked in chloride of lime at 22 degrees Tw.

Eighth, soured in sulphuric acid at ½ degree Tw.

Ninth, scalded in hot water for 3 hours with 3 per cent. soda ash and ¼ per cent. soap.

Tenth, chemicked in chloride of lime at ½ degree Tw.

Eleventh, soured in sulphuric acid at ½ degree Tw.

After each process, the goods are thoroughly washed to remove all chemicals used. The time the goods are boiled, the pressure boiled at, the strength of the chemicals, and time goods are steeped in same will, of course, vary a little according to quality of goods and other conditions.

The process outlined above will give excellent results on linen and on comparing it with the amount of work needed for cotton or union goods, the large difference is obvious at once.

AIRPLANE CLOTH

Airplane cloth as a rule is not bleached. The cotton cloth extensively used on American airplanes during the war was generally used as it came from the looms. Sometimes airplane cloth is scoured to remove the wax so that the dope will penetrate better, but it is a question how much penetration is desirable. The dope is to keep out moisture, prevent stretch and reduce air resistance, and forms a film over the cloth; and for these purposes bleaching is not necessary.

To scour airplane cloth, first give the goods a bath of hydrochloric acid at 1½ degrees Tw., run into a bin or pit, and let them age for 4 to 6 hours. Wash off thoroughly and be sure there is no trace of acid left. Then put into the kier and use a 1½ per cent. solution of caustic soda in the boiling-off process, boiling the goods for 8 or 9 hours at from 20 to 40 pounds pressure, according to the quality of the goods and the kind of kiers in use. After being boiled, the goods are thoroughly washed and care must be used not to get the material splashed with chemic or chlorine, otherwise there will be trouble with spots.

A 1½ per cent. solution of caustic soda means 1½ pounds of caustic soda to every 100 pounds of cloth in the kier. After boiling and washing, the goods can be scutched out, mangled and dried on a tenter frame to the finished width.

Glazing Sewing Thread

In the glazing of sewing thread, what effects do the different ingredients, such as borax, soap, wax, cocoanut oil, glue and flour have on the thread. Is it advisable to use china clay as a filler, or is this used only in shoe lace mills? (3803)

Borax gives extra lustre to the thread; soap is used for softening purposes; wax is used to give strength and lay the fiber; cocoanut oil is used to give the thread a smooth and soft appearance and to make it pass through the needle more smoothly; glue is used as a good substitute for paraffin wax; flour or starch is good for strengthening purposes. We believe china clay is never used for the shoe-trade business as a filler.

Repairing Husk Rolls

Can you tell us whether it is possible and practicable to repair husk rolls used on a mangle? We have a 5-roll mangle, 3 brass rolls and 2 husk rolls that measure 20 inches in diameter by 80 inches long. We run 68-inch and 76-inch cotton damask over these rolls. The rolls are in first-class condition except about 4 or 5 inches on each end where the husk seems to be rotten and is beginning to flake off. Can these bad ends be turned out here at our works and new material put in, thus saving the discarding of so much of a very expensive roll? (3797)

The rolls can be repaired provided the rot has not been allowed to get too deep, but it would probably be best to send them to the makers. If you have a lathe big enough and a man good enough to tackle the job it might be practical to try to make the repairs at your works. The ends of husk rolls should never be allowed to get too high. They should be scraped off with hand tools in order to keep the pressure evenly distributed across the face, otherwise this trouble will occur frequently.

Finishing Bleached Muslins

In finishing 64x60, 38½-inch, 5.35 plain cloth, after bleaching, into 36-inch bleached muslins for the domestic trade, which require a back filling that is not too heavy but of enough consistency to fill up the cloth properly, what formula of starch mix would you recommend for a 100-gallon mix? Could you also give approximate costs of the ingredients

used, so we could determine the total cost, and advise as to the approximate quantity of a starch mix of this kind that would be required in back filling a run of 35,000 yards of cloth? (3804)

The following formulas should give a good finish and a soft feel to the goods:

For 100 gallon mixing.

No. 1

50 lbs. corn starch.
25 lbs. potato starch.
10 lbs. dextrine or American gum.
50 lbs. dry talc.
20 lbs. French chalk.
16 gallons China clay.
10 lbs. cocoa oil.
2 qts. soluble oil.
Blue to shade.

No. 2

60 lbs. corn starch.
30 lbs. potato starch.
15 lbs. American gum.
70 lbs. talc.
25 lbs. French chalk.
20 gallons China clay.
15 lbs. cocoa oil.
4 qts. soluble oil.
Blue to shade.

The China clay should be steeped in water, boiled in the tub in which it is steeped, and mixed in the proportion of 4 pounds of clay to a gallon of water. It should be of the consistency of very thick cream. All the ingredients should be strained through a fine sieve so that there will be no grit in the mixings to cause marks on the back-filling machine.

If the first mix is too thin, the other should fill the goods properly. Before filling, the goods should be perfectly dried in the pure, and calendered through a 4-bowl calender, then put on rolls for the machine to back-fill. The mixings must be carefully put together, and when mixing measure up to 95 gallons before boiling, as the condensate from the steam during boiling will make up the other 5 gallons.

It is a good plan when drying up the goods in the pure to bring them off the tenter frame at 36 inches wide. After the goods have been put through the calender, back-filled and

dried again, they will have shrunk to about 34 inches, when they have to be damped, stretched and calendered again before they are finished. The stretching just breaks the goods up enough to give them a soft feel.

The costs of the ingredients can be obtained from dealers whose announcements will be found in the advertising pages of TEXTILE WORLD. Between 5 and 6 mixings, practically speaking, between 500 and 600 gallons of starch, would be required for 35,000 yards of cloth. The approximate cost at present (April, 1920), of the materials in No. 1 mix as given above is $18. No. 2 mix given above would cost about $24.50 for materials. If it requires 5 mixings or 6 mixings the cost will be 5 or 6 times these figures.

Stained White Wool in Mixture

We are having considerable trouble with a bluish cast on our 30-ounce frieze cloth, which is composed of 80 per cent. black carbonized shoddy, 14 per cent. black dyed wool, and 6 per cent. white scoured wool. We are enclosing samples of the correct shade and the shade we are getting, and also samples of the stock used in manufacturing. We enclose particulars of the goods and the details of the scouring and fulling processes. (3801)

The details of construction and finishing processes have been omitted from the printed question as there is nothing in them to cause the bluish cast complained of. The white stock has been changed to a pearl shade, and the cause undoubtedly is the black dye from the shoddy which is of a fugitive nature, and can easily be stripped off. Possibly the dyeing of the shoddy has not been well done, or it may be that the shoddy was not thoroughly neutralized after carbonizing. Coming in contact in this state with alkali might be the source of the trouble. We advise seeing that the shoddy is properly neutralized after carbonizing and properly dyed. We believe if this is done the trouble will disappear.

Streaks in Dyed Mercerized Stockings

We are having a good deal of trouble with light colors on mercerized hose. It seems impossible to dye these colors up without streaks, as you will notice by the enclosed sample.

I have tried several different methods; one of which was boiling the goods out in a weak solution of caustic soda

before dyeing, but did not have any success with it. I think the trouble is with the mercerized yarn. The yarn seems to vary a good deal and parts of it seem to absorb too much dye and the rest not enough.

If you can give me any information or make any suggestion, I will appreciate it very much. (3761)

The sample stocking examined seems to show that the trouble is due to uneven mercerization of the yarn. This is confirmed by the correspondent's statement as to the difference in the absorption of dye. Boiling the goods out after the yarn has been mercerized will not remedy the trouble, which should be looked for in the mercerizing bath, or in the succeeding operations of neutralizing and washing. Since mercerized yarn takes up more direct dye than plain yarn, why not make a test with sample skeins before knitting begins? This will surely confirm the quality of the work.

Removing Gum from Silk

Kindly give me particulars of a solution for taking the gum from Japanese tram silk, which is to be wound for the knitting of hosiery. How long should the silk be kept in the solution? (3798)

The following method is used by a very successful mill: For 50 pounds of silk use 2 pounds of neatsfoot oil, 1 pound of olive oil soap, 2 ounces of washing soda and 1 ounce of salt. The salt and soda are dissolved in a small amount of clear water at not over 70 degrees F. Boil the soap in about 2 gallons of water until dissolved, then add the neatsfoot oil, stirring well to make an emulsion. Then pour into 60 gallons of water, part of which is the salt and soda solution. Keep this well agitated until the silk is put in, otherwise the oil will rise to the top in which case it can never again be properly mixed. Thoroughly immerse the silk, which has been opened from the tight skein formation as taken from the "book," but not shaken out, and soak 8 to 10 hours. Remove the silk from the bath and extract by whizzing.

Use of Formaldehyde to Prevent Mildew

Under "Questions and Answers," your issue of March 13, "Weak Cotton Yarn," you suggest using one or two ounces of formaldehyde in each bale to prevent mold growth or mildew. We are very much interested in the use of this chemical and

would like to enquire if we use formaldehyde in boiling or dyeing, would it be necessary to use it again after the material was wet twisted. The percentage of moisture after the yarn is wet twisted is about 12 to 15 per cent., and we have been putting the finished thread through a drier to prevent mildew. Any information you can give in regard to the handling of this chemical would be greatly appreciated. (3806)

The use of formaldehyde in the dyeing operation serves to sterilize the yarn but not enough is retained to make it antiseptic. The very act of handling the yarn, or exposure to the air, will introduce mildew spores, which are present everywhere. As long as the cotton is absolutely dry mildew cannot develop, but the presence of even slight amounts of moisture favors it. After the yarn is baled, the application of formaldehyde destroys the spores already on it, and prevents their development, but if the bales were uncovered or moved about, they would need a new application each time. If a sizing is being used it is also advisable to add zinc sulphate to it to make it antiseptic. In applying formaldehyde the bales in storage could be sprinkled with an ordinary garden watering-can at intervals.

Effect of Concrete Floors on Textile Materials

Have you any record of concrete floors having any bad effects on cotton or silk material in manufacturing? The subject has been brought to our attention by one of our foremen, who claims that concrete floors will, to a certain extent, spoil the product which we manufacture. As we are now moving into our new mill, with all concrete floors, we would like to have your opinion on the subject. (3812)

We have no record of concrete floors having any bad effects on cotton or silk materials, and doubt that such floors have any deteriorating effect. It cannot be considered plausible that anything leaves the concrete in the form of a vapor and gets on the material through the air. However, if acids were spilled on the floor they might vaporize, and it is a well-known fact that silk will absorb acid vapors quite readily. This, however, need not be an effect due to the concrete.

Silk Hosiery Yellow After Bleaching

In our mercerized top silk hosiery we have difficulty with the silk being very yellow after peroxide bleaching, the mer-

cerized cotton top coming out an excellent white. The goods are knitted, then degummed with soap, bleached with peroxide, scoured and washed. Sample of the goods is enclosed, and we would like to have you indicate, if possible, the reason for the very yellow appearance of the silk. (3810)

There are three common causes which will produce the condition complained of by the enquirer. First, the dye used in the throwster's stain may be of a character which leaves a material in the boil-off bath which stains the silk and resists bleaching. Second, some soaps used in boiling-off have a tendency to stain the silk in this manner. Lastly, and most probably, too strong a peroxide bath, particularly when it is very alkaline, will make the silk yellow instead of bleaching it.

In any of these cases the remedy would be to put the goods into a bath containing about 2 pounds bisulphite of soda and 5 ounces sulphuric acid per 100 gallons of water at 120 degrees F. for ½ hour, then rinse well. They can then be blued and used as seconds.

In future cases care must be taken not to have the peroxide bath stronger than specified by the manufacturers and just faintly alkaline, not strongly so.

The fact that the cotton is well bleached shows that there is no deficiency of bleaching power, as cotton is more difficult to bleach than silk, and the silk is more colored than raw silk. If the reducing action of the bisulphite bath restores the white on the silk it also indicates that the color is due to over-oxidation. In case these suggestions fail to remedy the trouble it would be better to inform us exactly as to the proportions, temperatures and methods used throughout the process.

The dyer and bleacher of a large mill writes: I have had similar trouble in bleaching cotton and silk hosiery. The preparation of the goods before bleaching is a very important step, and ordinarily isn't watched as carefully as it might be. In boiling out silk hosiery one must be sure that all the gum is off, which can easily be judged by the feel of the silk. The goods must then be thoroughly washed free from the soaps with hot water.

If the goods are not thoroughly boiled out the bleaching of the silk is delayed which may cause the silk to be yellow. Any iron parts, such as nails in the equipment, cause the silk to become yellow. The condition of the bath has to be thoroughly understood and the best condition is very slightly alkaline. The bath shouldn't be too strongly alkaline as that

may tend to yellow the silk. The temperature should be brought to a point near the boil and then the steam shut off. In conclusion would state to watch the preparation of the peroxide bath, the begumming process and any chance of iron contacts in the bleach box. With the ordinary China or Japan silk I believe the enquirer will overcome this trouble by watch-in each step in the bleaching process.

After receiving the above replies, the enquirer sent the following: This is to thank you for your letter of April 16, enclosing suggestions concerning the difficulty with a silk hosiery sample recently submitted. You may be interested to know that I find the probable cause to be in the softening oil which is used on the silk previous to knitting. This seems to me rather unusual, but to my mind is the explanation of the difficulty.

Scouring, Drying and Oiling Wool

I am writing you for some information on the scouring, drying and oiling of wools as carried out at some of the best mills. This information will be of much value in connection with my wool investigational work.

1. What is the right temperature and what are the proper amounts of soap and soda to be used in a 4-bowl scouring machine?
2. At what temperature does the first appearance of injury to wool occur?
3. At what temperature would you advise running a 2-compartment wool dryer of the conveyor type for ½, ⅜ and ¾ blood wools?
4. What kind of a lubricant is the best for use in a wool picker? (3813)

The temperature usually considered best for scouring wool is around 120 to 130 degrees F., and the amount of soap and soda used depends, in large part, upon the character of the wool to be scoured and also upon the individual judgment of the man in charge of operations. The usual method is to have the strongest soap and soda solution in the first bowl; in the second bowl, soap solution only; in the third bowl, a weaker soap solution, and in the fourth, clean, warm water. Wool grease comes off quite easily and high temperatures are not required.

It would be difficult to say when injury to the wool is set up, but the temperature perhaps is less harmful than an excess

of alkalinity, which is always to be guarded against. In a strongly alkaline solution and a temperature of 160 degrees F., you would probably get deterioration of the wool fiber. As to drying temperatures, from 180 to 200 degrees F. ought to be all right.

With regard to lubricants, it is all a matter of individual judgment or prejudice. Some mills use lard oil, red oil, oleine and various mixtures of these oils in conjunction with high grade paraffin oils. The main thing about a wool oil is that it should lubricate the fiber thoroughly, not gum the cards and scour out easily.

Duties of Second-Hand

Will you kindly tell me the duties of a second-hand in a cotton weave room of about 500 looms, making 8-ounce army duck? (3805)

In most mills a second-hand's position is rather indefinite as regards specified duties. The second-hand is expected to make himself useful in actively assisting the overseer in every way possible. He ordinarily is expected to exercise a general supervision over the operation of the department, carry out instructions of the overseer, "keep the time" of the help, that is, keep a record of the attendance of the operatives. He should see that each loom-fixer, weaver or other employe does his work properly, that looms are kept in repair and that speeds are maintained. Also make himself familiar with the capabilities and limitations of the various employes under him. The second-hand generally supervises the distribution of supplies within the department, inspects cloth that has been rejected on account of poor quality, and takes steps to reduce the number of such rejections. He keeps the overseer posted as to undesirable conditions existing in the department, smooths out difficulties among the help, and in general does all in his power to assist in the effective operation of the department.

Loom Production Calculation

On page 121 of your issue of March 6, I noticed a production chart and on trial found it to be a quick way to estimate the hourly production. In the absence of the chart a good way to estimate production is as follows:

With looms running 105 picks per minute on a 48-hour schedule, a loom would pick 302,400 times in a week if run continuously. Allowing 20 per cent. stoppage for broken ends, changing shuttles and breakdowns, the loom would pick 241,920 times. Dividing this last number by 3,600, which is the number of picks per yard in goods containing 100 picks per inch, we find a production of 67.2 yards weekly.

It is now a simple proposition, with the 67.2 yards as a basis for 100 picks, to multiply that number by 100 and divide by the number of picks in any kind of goods to find the production of such goods. For example, take a cloth with 44 picks per inch:

$67.2 \times 100 = 6720$

$6720 \div 44 = 152.7$ yards per loom per week.

A superintendent can always have this calculation in his mind even if he is away from the mill where the chart lies on his desk.

R. GLEDHILL,
Somerset Worsted Mills, Skowhegan, Me.

Production of Shoddy Cards

We are installing cards to make shoddy for the trade. We have put in cards 48 inches wide, 42 inches diameter, having 5–7-inch workers and 18-inch doffers, and are running two of these doubled up. What ought our production to be on each card for an 8-hour run. We intend to run all the different grades of coarse and fine rags commonly used in making shoddy for the trade. Kindly give me your idea of production on fine merino rags; also on delaine and coarse rags. The cards are well clothed with new, first quality clothing.
(3814)

The production on the equipment of cards mentioned is largely determined by the condition of the material to be carded. If the stock is well opened up by the pickers previous to carding a large production should be assured providing the cards are kept going continuously during the working hours. A production of 200 to 250 pounds in an 8-hour day may be expected on fine merino rags, and 350 to 400 pounds on the coarse rags.

Owing to the importance of thoroughly carding out the threads in the fine shoddy, which is used for fine yarns which require considerable drawing in spinning, quality should not be neglected for production. On the coarse shoddies which

are used largely in the manufacture of coarse counts which do not require much draft, a large production should be possible when the cards are properly adjusted.

A shoddy manufacturer replies as follows: As a preliminary to thorough carding, the stock while in the picker-room should be well oiled. This being done the batch should remain undisturbed for at least 12 hours, in order that the fibers may be well saturated. Otherwise fine threads will slide through the cards, leaving what is termed thready shoddy. Cards in good condition should turn out approximately 18 pounds per hour on fine merino rags. Delaines should be put through breaker cards to open the stock. These rags, then run through shoddy cards, should yield about 20 pounds hourly. Shoddy cards on coarse, well-oiled rags should produce from 23 to 25 pounds an hour. These figures are merely relative, as when cards are heavily fed the output is greater but the resulting shoddy is not so well carded.

Souring Cotton Piece Goods

Will you please advise the writer through your columns regarding the souring of cotton piece goods being bleached and finished for market bleach. As an example take a lot of 35,000 yards of 38½-inch, 64/60, 5.35 print cloths that have been caustic boiled and chemicked with liquid chlorine. In souring with sulphuric acid, how long will it take the sour to act and can the goods be run in a continuous run from the souring squeezer into a small piling machine, which would accommodate about a 1 or 2-minute run of cloth, and then directly through the final wash? Also what would be the proper twaddle for a souring bath for this purpose? (3811)

In the souring of cotton piece goods as the final process after use of liquid chlorine, it is customary to give the goods at least 10 to 15 minutes contact with souring liquor. This is usually accomplished by the means of a piling machine. Where the piler is not available, it is customary to lay the goods down in piles. Strength of acid liquor is as a rule ¾ degrees Tw. sulphuric acid.

The enquirer may be interested to know that some concerns who are bleaching the line of goods mentioned do not sour at all after the final chemicking, the final process being an extra good wash and the goods are blued for finished white in such a case with ultramarine blue. This type of blueing gives a much brighter and cleaner piece of finished goods.

A bleacher replies as follows: The length of time it will take the acid to act depends on the condition of the cloth and the strength of the chemic used. I would advise making bins or boxes for ageing either the chemic or sour baths so that a kier could be split up into quarters, and by the time the worker has broken off the goods in his first bins, and then filled up the second set of bins, he will be able to pick up the goods in the first bins and wash them up ready for the scutcher. The proper strength to use a sour bath for goods of this weight would be about 1 degree Tw., taking into consideration the strength of chemic used. A rough method or standard to apply is to use the acid from ¼ to ½ degree stronger than the chemic used. Every bleacher knows one kier of goods has to be treated different from another and that he has to use his chemic and sour baths according to the conditions.

Soft Places in Cotton Yarn

I am sending you a sample of soft, coarse cotton yarn used as a filling for blankets. I wish you would have one of your experts test this for me and tell me what the trouble is. By holding the bobbin so as to make a little friction in the yarn you can find a number of soft places. You can pull off a few yards before it breaks and then it will break quite often. The spindles are driven by gear so there is no chance for a slip unless the bobbin flies up on the spindle. (3816)

The soft places where the yarn pulls apart easily do not contain any perceptible twist, due to the fact that the yarn is uneven, and wherever there is a thick place in the yarn it is lacking in twist. One of the well-known principles of spinning is that no twist will be inserted in a thick place until a thin place has taken all it can, hence no matter how positive the drive of the spindle may be, if uneven roving is being fed, uneven twist will be placed in the yarn and soft places will result.

The remedy is to get the roving more even by giving attention to the processes preceding the actual spinning of the yarn. Causes of unevenness may be that the staples of cotton used vary too greatly in length of fiber; laps from finisher picker too uneven, either in thickness of sheet, or in weight of lap produced; over, or excessive drafting at the card or fly frames.

Too much twist in the roving will also cause uneven draw-

ing, or drafting, and as a result uneven roving and yarn. If the processes preceding spinning cannot be improved, the only way to offset the defect referred to is to insert more twist in the yarn, or sufficient twist to eliminate the soft places. The latter remedy will, of course, necessitate a more effective napping to get the desired cover, or nap in the finished blanket.

Cleaning Fibers by Compressed Air

I am interested in an air picking process for textile fibers. Without doubt you can supply me with some information on this subject. I believe that you published an article some time ago in regard to an air picking machine which has recently been developed. (3820)

The article referred to is "Textile Uses of Compressed Air," printed in TEXTILE WORLD of January 10, 1920, which describes and illustrates a system for opening and cleaning cotton by compressed air. The process was developed by J. F. Reardon and has been installed in the American Printing Company's plant at Fall River. It uses a trunk conveyor into which compressed air is shot by means of nozzles so placed that they direct the air into the mass of cotton passing along and hurl the fibers against impingement bars which shake out dirt. It has been found to clean and bloom the cotton thoroughly before delivery to the lappers, and is said to permit the use of one or two lower grades of cotton for equally good cloth. Copy of the article has been sent to the enquirer.

Sizing Warp for Tape

Kindly advise what would be the best method for sizing 1/30s carded yarn such as is used in producing the attached sample of tape. Also advise what would be a good formula to use for making a size solution and the temperature at which the solution should be maintained during the sizing operation. The warps used in weaving this tape run from 320 to 480 ends and are placed on a beam 26 inches long which contains approximately 50 pounds of yarn. Would it be better to size this yarn by bunching the warps or by running them with the threads spread out. Should heat be applied to size box or to size kettle and solution circulated by means of a pump? (3819)

The warp would be best sized in a slasher with the threads spread out separately and not bunched as would be the case

in chain sizing. Good results would be obtained from a thin boiling corn starch of a fluidity to be determined after observing the exact conditions. Usually the best results are obtained by holding the temperature of the size at 190 degrees to 200 degrees F.

Both the size kettle and size box should be heated with open steam jets. Steam should be supplied from lines properly insulated and trapped so that dry steam enters the size mixture.

A circulating system is of benefit in securing uniform results and is especially recommended when the equipment consists of more than one or two slashers. Such a system works to best advantage when used in connection with a storage kettle. This kettle should be well insulated, heated with a closed steam coil, and provided with a stirring device. All lines through which the hot size passes should be well insulated to prevent loss of heat and consequent dilution at the size box.

Sizing Huck Towels

We wish to take advantage of your kind offer under "Questions and Answers" and ask you how we should size huck towels and light crashes. We have a 2-bowl starch mangle (not for back filling), a brass roll and a rubber roll and a 120-gallon iron starch mixing tank with agitator.

No doubt the goods should be dry when entering the starch mangle but as we are not fitted up very well to do this, would it not be possible to run them in damp?

What ingredients would the starch formula contain, including water and everything, and about how much mixing would it require to run 20,000 yards of huck toweling, 18 inches wide, 80x72, about 3 yards to the pound? We enclose sample of same. At what temperature should we keep the bath? If possible, we mean to starch, dry and calendar but once. Is 80 yards per minute through the mangle a suitable speed?

(3822)

It is assumed from the tone of the question that it is desired to size the huck towels and crashes to give them a better handle and feel, without bleaching them white. If this is the case we do not understand why the enquirer asks whether it is possible to run them damp. If he desires to size the goods in the gray they should be taken right from the loom and after inspection passed through the size without being dampened at all.

If the enquirer is bleaching or souring them and has only the one 2-bowl mangle, he should use it as a water mangle

to squeeze the goods as dry as possible before sizing them, using as much weight on the machine as convenient to squeeze them dry enough to take the size. After the goods have been mangled or squeezed out enough to start sizing, the mangle-box can be washed out clean before putting in the sizing solution. When starting to run the goods through the size keep a good watch on the size in the box to see that the surplus water out of the goods does not dilute it too much. Otherwise some pieces will be stiff and some soft. Where the size was at full strength the goods will be stiff, and where it was diluted with the surplus water they will be soft. The solution should be put in the box systematically to aid in keeping the size about the same strength.

If the goods are passed through the size dry, a uniform feel is bound to result as the size will remain at the same strength all the time, and it is simply necessary to keep adding more as the goods lick up the solution. On the other hand, when goods are passed through damp, there is always a certain amount of surplus water squeezed out of the goods that will dilute the sizing solution and make it weak, giving uneven sizing and a different feel to different parts of the goods.

If the goods are to be sized in the gray, take them right off the inspecting table, sew them together and pass them through the sizing solution. Do not dry the goods up right away, but let them lie for about 2 hours to allow the size to penetrate the oils and grease contained in the goods. It is not necessary to keep the size bath at any given temperature provided the solution is properly boiled or cooked. The speed of the mangle could be increased to run from 120 to 140 yards per minute, 80 yards being the minimum speed for very heavy goods. Light goods like the sample could easily be run at the higher speeds.

A formula suitable for this class of goods could be obtained from the following, using discretion in mixing and handling the goods:

No. 1

50 lbs. corn starch.	10 lbs. dextrine.
15 lbs. potato starch.	2 qts. soluble oil.

Make into 120 gallons.

No. 2

60 lbs. corn starch.	10 lbs. American gum.
25 lbs. potato starch.	5 lbs. cocoa oil.
20 lbs. dextrine.	Make into 120 gallons.

No. 3

50 lbs. corn starch.	20 lbs. Epsom salts.
30 lbs. potato starch.	15 lbs. American gum.
25 lbs. dextrine.	4 qts. soluble oil.

Make into 120 gallons.

No. 4

60 lbs. corn starch.	20 lbs. American gum.
10 lbs. potato starch.	5 lbs. cocoa oil.
20 lbs. dextrine.	2 qts. soluble oil.
30 lbs. Epsom salts.	Make into 120 gallons.

Thoroughly mix these ingredients and boil for 4 minutes after the mixture comes to the boil. Pass the goods through the solution, using a roller in the bottom of the size box so that the goods can get a thorough immersion in the sizing solution, using discretion in the amount of weight used on the mangle. One of the above solutions ought to give the desired results. It would take between 2 and 3 mixings to run 20,000 yards of the goods if run wet and probably more if the goods are passed to the solution dry.

Difficulty in Winding Dyed Artificial Silk

We are having serious trouble with our artificial silk dyeing. The skeins as they come from the drying-room are more or less matted at the lea-bands, making the winding process very difficult and wasteful. Sometimes the silk cannot be wound at all. Can you give us some idea as to the cause of this, or give us a formula to dye a good jet black that we could try out? My own impression is that the silk is kept in the wet state too long; sometimes four to five hours in the dye tubs. We are using 150 denier Eng. A. quality silk. Are there any publications regarding the dyeing of artificial silk? (3824)

An examination of the samples submitted shows that the trouble is purely mechanical. The bands naturally prevent the free movement of the fibers, which are held in a distorted form and dried in an unnatural position. Artificial silk, being more sensitive to moisture than natural silk, does not come back to its original shape when dried, but retains every bend and kink. The only remedy you have is to stretch and dress up the skein to good form while it is still damp, and if the fibers are made parallel they will remain so and wind easily.

The only objection to long dyeing is the extra amount of

working the material is subjected to. An ordinary direct black should be finished in an hour, but developed blacks would, of course, take longer. The manufacturer of your dyestuffs will be glad to adjust this matter for you and we are sure the time of dyeing can be greatly shortened.

We know of no book especially devoted to dyeing artificial silk, but most books on dyeing have a few pages or a chapter devoted to this subject.

Finishing Processes for Unbleached Muslin

Will you kindly inform me how many and what finishing processes the ordinary unbleached muslin of the retail trade has been submitted to after leaving the loom? (3825)

Unbleached muslins, after weaving, are usually inspected, brushed and then run on a calender rolling machine which gives them a slightly ironed effect without having the finishing effect or the starch effect. They are then folded or rolled for the market.

Heather Mixture Hosiery

We want to know the best way to make a silk and wool ladies' hose, on a 240-needle circular knitting machine. Can you give the size of the wool yarn and the size or count of the pure thread silk, and how these are used to make the fabric appear smooth and fine? We would also ask some advice in regard to making a ladies' all-wool or cashmere stocking. What is the best thing to use in the way of yarns? Is the heather mixture very popular? What price does this class of goods bring on the market to-day? We do not know anything about wool and any information you may give us will be appreciated. (3823)

To make silk and wool ladies' hose on a 240-needle circular machine is a very difficult proposition. However, it can be done by using 50s worsted and two strands of silk twisted together. But we certainly would not suggest making this number, as you will find it very difficult, owing to the fine gauge of the machine. The price of such hose would be approximately $15 per dozen (April, 1920).

If you want to make an all cashmere stocking on the same gauge machine use a size 40s worsted. The finished stocking from this number would weigh about 1¼ pounds, and the present price would be about $12. If you are equipped with

240-needle machines, we would advise you not to start in to make wool hosiery. If you are just starting we would suggest a much coarser gauge, say 160-needle circular machine, and a 4-inch cylinder to make heather mixtures, as the heather numbers are more popular than anything else at the present time, and we expect them to continue in demand, though none of us can tell how many seasons they will last.

A heather mixed stocking made on a 160-needle, 4-inch cylinder, weighing 2 pounds, would sell to-day (April, 1920), for about $18 per dozen.

Waterproofing Braided Cord

We are desirous of waterproofing braided cord like the enclosed sample. Will you advise us how this can be done? (3832)

The waterproofing of cords is done in two ways: First, by proofing the yarn before braiding; second, by braiding first, then subjecting the cord to the proofing process. In either case several methods may be employed.

Proofing of cotton yarn is extensively done by impregnating with a solution of acetate of alumina made by dissolving 30 pounds of alum in 50 gallons of water; afterwards adding 30 pounds of sugar of lead. Heat by means of steam until no lumps remain; allow to settle, using the clear top liquor. After soaking the yarn in this solution for 2 hours it is lifted, drained and passed through a weak soap solution, which causes a deposit of an aluminate of the fat of the soap in the yarn. Such yarn when dried is water-repellent.

Another method, using alum and glue, is as follows: 50 pounds of alum is dissolved in 500 pounds of water; 50 pounds of glue is soaked in 10 gallons of cold water over night; in the morning heat to boiling and when solution is complete stir in 2½ pounds of tannic acid and 1 pound silicate of soda, and add the entire quantity to the alum solution; mix thoroughly, cool to about 170 degrees F., enter the yarn, and allow to remain immersed until saturated; finally squeeze and dry.

An excellent waterproofing medium which perhaps has no superior is a mixture of rubber and paraffine wax. It is not only waterproof but an excellent insulator. Five pounds of paraffine wax is melted in an iron pot; add 1¼ pounds of scrap rubber and continue heating until the rubber is dis-

solved; allow to cool and solidify then cut up into blocks for use. The material to be proofed, whether yarn or cable, is weighed in the dry state, and for every 8 pounds allow 1 gallon of benzine in which is dissolved 3 ounces of the above paraffine-rubber mixture. The material to be proofed is immersed in this solution which soaks it up in a very short time, after which the benzine is allowed to evaporate, leaving a thoroughly waterproof deposit on the material treated. If cable has been so treated, a finish may be imparted to it by passing it between heated grooved rollers. In some works the cable is rubbed with paraffine wax before going through the rollers.

Effective waterproofing of cables is also done by drawing the cable through melted paraffine, which is kept melted in a long, shallow pan, the cable being kept below the surface by guide rollers. The cable, upon leaving the pan of wax, is drawn between wipers, then through grooved finishing rollers, and finally coiled.

Tender Bleached Yarn

We are troubled in bleaching our cotton yarn with chloride of lime, with lots that are greatly weakened by the process. Can you make any suggestions as to what may be the cause of this? (3830)

It would have been better for the enquirer to have sent us the details of his process. Without this information only a general statement on the causes of excessive tendering of yarn in bleaching can be given.

Tender yarn may be caused in several ways. In the first place, the yarn can be boiled too long. The boiling solution may be too strong. The yarn may not be freed from the solution before entering in the chemic bath. The chemic may be too strong. The goods may be left in the chemic bath too long. Traces of chemic may be left in the goods after rinsing. If a sour bath is used for neutralizing the action of the chemic on the yarns, and there is a trace of chemic left in the yarn, it will also help to make the material tender. The yarn made tender from having acid left in it will generally turn black in the drying process, but will not become tender until dried. Oxycellulose can be produced from cotton in from 4 to 4½ hours with a chemic at 4 degrees. This will occur in a shorter period if the cotton is boiled longer in the kier.

Scouring Cotton and Worsted Hosiery

Can you give us a process used to scour 2-pound half cotton and half worsted socks made on 108-needle machines? (3829)

A practical working formula for 100 pounds of the grade or hose this enquirer is making is as follows: Make up a bath containing 3½ pounds of white soap or green olive soap and 2½ pounds of soda crystals; have the temperature 110 degrees F.; run the goods in this for 10 to 15 minutes, then let the liquor drain out and run dry for 5 minutes. This operation is conducted in a regular rotary washer. Give lukewarm water and repeat the identical procedure; then give 2 final warm waters, and finish by making up a liquor with 2 pounds of acetic acid, running for a few minutes. Extract excess liquor. If the goods contain a great deal of cotton, more soda could be added and the heat raised a bit higher.

A hosiery manufacturer replies to this question as follows: For 50 gallons of water use 7 or 8 pounds of a good palm or olive soap and 3 or 4 pounds of soda ash. Boil until all the soap is dissolved. For 40 dozens of socks use 4 pailfuls of the liquid. Wash 12 minutes in lukewarm water, then rinse 10 minutes; then wash a second time for 5 or 6 minutes with 2 pailfuls of the liquid, and rinse with lukewarm water until all the soap is rinsed out.

Fulling and Scouring Knit Jersey Cloth

Would you kindly advise the best way to full and scour a piece of wool jersey cloth, made out of 1/22 cut, so that same should have a smooth face after fulling? Also how can we eliminate all of the odor of oil and soap? (3839)

The best way to full and scour wool jersey cloth to obtain a smooth, well-felted face, and prevent all disagreeable odors, is to use a good palm oil soap, heavy body, say 12 ounces to the gallon, and about 2½ to 3 degrees strong in alkali. Should the wool used be carbonized stock, it may be necessary to increase the soap to 16 ounces and the alkaline strength of the solution to 5 or 6 degrees.

If the first solution is used and the soap while fulling remains "alive" and does not become watery and dirty looking after 30 minutes run, the enquirer may be sure he is on the right track. Should the soap lose its body and turn to dirty

water, the goods should be taken from the mill at once and scoured out, then refulled. The next batch of soap should be made as above stated, and in the making should be boiled at least 5 hours.

When the goods have been successfully fulled and put in the washer, they ought to have at least 2 pailfuls of a good scouring soap added to each piece before any water is added. If this works up into a rich thick lather, all is well. They should be run in this at least 20 minutes, and rinsed off for an hour and a quarter; whether warm or cold water is used is immaterial. Should this soap, however, be killed after 5 or 10 minutes running, the gates should be opened and the dirty soap allowed to run off (no water should be used at this stage) and another 2 pailfuls to each piece added. This time they will undoubtedly work up into a rich lather.

Goods finished as described above will have no disagreeable odor, and if the soap stays alive in the fulling mill, a well felted, smooth face will be the result. A rough face is generally the result of thin watery fulling.

Shaded Cloth

We are making a fabric out of a 2-ply colored twist yarn with a different color mixture filling, of which we are sending you herewith a clipping. We get a lot of light and heavy places in this cloth and it seems to us they occur only where the weaver changes his shuttle. We are weaving the cloth with three shuttles, and are giving the weaver only one shuttle with which to change, and still we have light and heavy places which show on the dividing line a light color and a dark color, as though it were made by two different colors. We are sure the filling is not shaded as we have personally examined is very carefully. It is made up by one of the finest spinners in this country. Only one lot has been used. Please let us know how we can overcome this trouble. (3836)

From the question we assume that the mill is satisfied that the trouble is not caused by the filling bleeding out color in the steaming of the yarn, or in the wet finishing of the fabric. The shade of blue mixture used has a bad reputation for acting in such a manner, and particular care has to be taken with it. Outside of this cause, and assuming that the fault is not on account of uneven filling yarn, we think that the conditions of the loom layout contribute to the trouble, for while the warp ends are approximately 26 per inch, the filling

picks count 32. Thus the filling has too much control. The basket weave also tends to the evil, for although the intersecting is the same as with 4-harness twill, the fabric produced is looser. We notice that the two threads in the same mesh have been reeded in the same dent, and advise splitting them, which will incline to stiffen the setting in the reed. We also advise seeing that the filling running from the bobbins in the shuttles is properly dragged inside the shuttles, and that the let-off and take-up motions of the loom are kept in perfect working order.

Layout of Dressing Room

We are considering a rearrangement of our dressing room and possibly the adding of another frame to reduce overtime work. Have you any information on the layout of this department? (3833)

An excellent article on the layout of equipment and lighting arrangements in dressing-rooms was published in TEXTILE WORLD of October 5, 1918. Copy of this article has been sent to the enquirer.

Weights for Spinning Rolls

In cotton spinning, what are the best amounts of weight to apply to the rolls for counts of yarn from 16s to 50s with standard twist constants and ordinary roll speeds? (3844)

In one note, we find that for double roving with a medium draft, a weight which will, when multiplied by the leverage, produce a total pressure of from 25 to 30 pounds is satisfactory. However, we think that this figure would better be around 20 pounds.

Two of the very prominent spinning-frame builders equip their frames for coarse work with weights which produce a total pressure of 19 and 34.2 pounds, respectively. The latter is intended particularly for waste, which probably accounts for some of the difference. Further, the roll diameter is smaller than the average which, of course, would necessitate additional weight.

For the frames designed to make medium-sized yarns, these concerns put out machines which give a total pressure of 16.3 and 19.5 pounds, respectively, the former being arranged to give total pressure of 14.1 and 12 pounds, if desired.

These two types will spin yarns between 16s and 50s very satisfactorily with the weights arranged to give the total pressure spoken of above, that is, 16.3 and 19.5 pounds.

Since machine makers design their stirrups differently, it is impossible to say that a 3-pound weight at the end of the lever is satisfactory. Consequently for comparisons, the total pressure on the rolls is the best figure to use. To determine this, multiply the weight by the distance from the eye at the opposite end of the lever, and divide the result by the distance from the eye to the point at which the stirrup supports the lever. Use the weight in pounds and the distances in inches.

Mixing and Storing Oils

Can you advise us how to mix red oil and mineral oil to be used for oiling wool? We would like to do this on a fairly large scale and store the compounded oils in tanks for future use. Is any special process required in mixing the oils so they will not separate while in storage? Is heat required in the mixing? Which would be the best to use, a single or double pressed red oil, and why? Is any special apparatus required for mixing oils? (3843)

There is no special difficulty in the way of carrying out this plan. You would require an iron tank to hold, say, 10 or 20 barrels, fitted up with a steam coil of sufficient dimensions to raise the mixture to about 212 degrees F. If you are making a 10 per cent. mixture, put in 1 barrel of red oil and then add 9 barrels of the mineral oil selected. Turn on the steam and stir occasionally with a wooden rake until boiling point is reached.

In a mixture of these two oils there will always be a separation owing to the fact that the stearic acid, which is the solid constituent of red oil, is not soluble in mineral oil at the usual temperature. It will, therefore, be to your advantage to use double-pressed red oil because it contains much less stearic acid than the single pressed.

Piping in Worsted Mill

Will you kindly inform me whether iron or copper water piping is best suitable for the wash house and dye house of a worsted mill? (3845)

Piping used in wash rooms and dye houses is made of castiron, steel, copper and brass. Castiron pipes are frequently

used for the main cold-water supply and are run in trenches, supported well above the bottom of the trenches and set so that drains from the kettles do not discharge the liquor on them. The branch lines to the kettles, washers, etc., are generally steel pipe.

The hot-water supply mains and feeds are also generally of steel pipe. All overhead piping is covered, the hot-water lines to prevent loss of heat and cold-water lines to prevent sweating.

The main steam and feed lines are also of steel pipe down to the machines. The steam pipes in the kettles are generally of brass. The metal used in these pipes, however, depends on the liquor. In peroxide of sodium bleaching lead pipes have to be used. In heaters the pipes are made of seamless drawn copper tubing.

Sprinkler pipes are usually of steel but galvanized pipe will last longer. When steel pipes are used, they require cleaning and painting annually so as to prevent corrosion due to acid fumes.

Moisture Standard for Artificial Silk

What is the moisture standard for artificial silk? I do not find it listed in any tables on textile materials. (3842)

The percentage of moisture in artificial silk is about the same as found in real silk, normally varying between 9 and 13 per cent. The average is taken as 11 per cent. and this figure is used as the standard, the same as for natural silk. The enquirer will find this listed in a footnote following the table of regain standards of various conditioning houses, on page 133 of TEXTILE WORLD's 1917 Kink Book.

Aniline Black on Hosiery

Some time ago you published some articles in regard to dyeing aniline black on hosiery, giving processes used when singeing; also when finished by rumbling. Would ask if there has been any recent change for the better in any of these processes.

We have had very good success with our aniline black on hosiery and have had no trouble with goods being tender, but recently we are having quite a little trouble with goods seeming to have a harsh feeling and not as strong as they should be. We have made no change whatever in our process,

although we are using another make of aniline oil. We are sending sample piece to show just what our trouble is.

Is there any way that aniline oil can be tested? The liquor shows the strength as always and it does not appear to be acid on test, so we are really at a loss to know what is causing our trouble. We have also had some trouble with goods crocking, that is, there seems to be some of the dye that was left on the goods after finishing, but after thoroughly washing they are all right. Kindly give us what information you can in regard to this matter and we will greatly appreciate it.

(3838)

It is very difficult to form any opinion regarding the black shown on the sample of knit goods submitted, or to offer suggestions regarding the process used, when no details are given. The black itself is good, but without doubt would appear brighter and clearer if dyed upon material made of yarn of a finer count. As to the harsh handle in the finished goods, this may be due to a change in the yarn, or in the quality of the cotton, or, as is more frequently the case, may be due to the dyed material not being thoroughly washed and softened.

As to the goods crocking, this may be due to too rapid oxidation of the aniline, thereby causing a superficial deposit of black on the cotton, rather than a true dyeing. This is generally caused by too hurried work in the dye house, and in the present instance may be the result of sacrificing washing at the expense of clean goods. The writer believes that these goods are correctly dyed, judging only from the sample, but thinks that the crocking may be overcome by giving more time to the washing.

Regarding the lack of strength in a sample of dyed goods, it will be well to examine carefully the several quantities of chemicals used in the process, observing particularly the amounts of muriatic acid. Sometimes a slight excess of this acid is likely to cause injury to the cotton, especially during the tumbling.

Aniline oil should be uniform, and can only be controlled by a carefully made distillation test, as described and fully illustrated in TEXTILE WORLD RECORD of August, 1915, and another brief article on the same subject published in the TEXTILE WORLD Kink Book for 1917. In purchasing aniline oil or salt, it is well to stipulate in the contract that it is to conform in every particular to a given sample that has been found by an actual practical test to be fully satisfactory.

Contraction Due to Twist in Yarns

Is any information available showing the contraction in cotton yarns with varying amounts of twist? (3841)

The enquirer is referred to an article in the July 14, 1917, issue of TEXTILE WORLD, which gives the results of tests conducted by Stephen E. Smith, head of the cotton yarn department of the Lowell Textile School. No other information on this subject has been published, we believe.

Yarn for Looping Hosiery and for Mock Seams

Will you please advise me what yarns to use for looping 240-needle, 3½-inch diameter silk hosiery; also what yarns to use for making the mock seam in these goods. (3846)

The yarn used by many manufacturers for looping 240-needle, 3½-inch diameter silk hosiery is 3/90 lisle.

There are two ways of making mock seams. One is made automatically on a knitting machine, and the yarn used for this is 3/45 lisle. The other is made by using an over-lock stitch sewing machine, like Merrow, Union Special, or Wilcox and Gibbs, and the yarn generally used in this operation is 2/60 mercerized.

Moss Finish on Tweeds and Overcoatings

Will you kindly oblige us with information as to how to obtain a "moss finish" on tweeds and overcoatings, similar to attached clipping. If possible give us a description of the process used, and the several machines employed to obtain this finish. (3851)

There are several methods of obtaining a "moss finish" on tweeds and overcoatings. With cloth made out of a soft spun woolen yarn, loosely woven, which requires but little fulling, the goods should be carefully napped in the grease, beginning with the back, giving one or two runs to raise the fibers from the surface, then one or two runs on the face, making the fabric fluffy. The pieces are then fulled to the required shrinkage.

Care should be exercised in laying goods out in the loom so that the shrinkage will not be excessive, as in a melton, for instance. They should "go up" in from an hour to less than two hours. This short fulling will knit the fibers together,

and at the same time allow the fabric to have the soft, lofty, "mossy" handle and appearance. A good heavy palm oil soap should be used for fulling, 12 ounces to the gallon and not too strong in alkali. The heavy soap knits the loose fibers together quickly and prevents too much loss of stock from chafing; whereas a light soap prevents felting, and the loss in stock costs much more than a little extra soap, besides producing a skinny, open face, which when worn soon develops into a shiny, threadbare rag.

Care should be taken in napping not to overdo it, nor to dig too deeply, as a tender piece will be the result. Better to go slowly and gently. Any of the usual makes of planetary nappers, which have from 12 to 36 working napper rolls, may be used for this work.

Another method, which is also very successful, is to full the goods in the grease until the felting and shrinking is almost accomplished, when they are taken out of the fulling mill and napped wet with the soap in them. In this condition the fabric is much stronger and will stand more napping. When napped to the required density, the pieces are returned to the fulling mill, sewed in again, and a good pailful of soap added to each side, or two pieces. Twenty minutes to half an hour's run will now mat the fibers together and finish the shrinking, giving the goods a good moss finish.

In either case, when the fulling is finished the goods are put in the washer and new soap (a lighter bodied scouring soap) added. They should be made to work up into a good rich lather before any water is added. Here is where many finishers err. They have the idea that warm water added to the goods, which they argue are full of the fulling soap, will lift all the grease, dirt and loose dyestuff and thoroughly cleanse them. They lose sight of the fact that the fulling soap has been practically spent in the process of fulling, so that when water is added in the washer it is even more reduced in both strength and body, with the result that instead of lifting the grease, dirt and dyestuff, they are all set in the body of the goods, resulting in offensive odors, gummy handle, and dead colors on finished goods.

ROUGHER FINISH

If a rougher moss finish is required, the second fulling may be dispensed with, the goods being fulled right up to shrinkage, taken out and napped with the soap still in them, then put in the washer direct from the napper.

They should be allowed to run at least half an hour in soap and when water is turned on care should be used to see that it is not too hot, as hot water dulls the colors. Fifteen minutes in warm water is sufficient. Cold water will lift any soap that has done its duty properly, and give the goods a loftier handle and brighter colors. For an overcoating, 1¼ to 1½ hours in water is sufficient.

Goods are dried in the usual manner and the only finish required now is about 3 to 4 runs around a steam brush, with brushes not touching. This lifts the dryer baking out, swells all the fibers and makes for a loftier, fluffier piece.

In some cases it may be found advisable to give pieces a run or two on the shear if there are too many wild fibers protruding. This should be done from the dryer, care being taken to keep both raising and laying brushes well off. The steam brushing comes next. Goods should be allowed to lie in loose folds all night from the steam brush, then examined, measured and made up. No pressing.

A superintendent comments as follows on the sample: The idea of finish of the cloth represented by the sample is to raise cover enough to hide the weave and also the low quality stock of which the cloth is mainly composed. To carry out the idea, a small proportion of white B super wool is used. The warp is also laid rather wide and thin in the reed, so that the raw fabric will full readily or without much breaking up of the construction threads. Both the back and face of the fabric is napped to the needed extent before fulling. Shearing is done on the face but not on the back, and only for the purpose of straightening the nap. Guard carefully against overfulling, as in that event the white wool will be felted together in patches.

Lime Stains on Knitted Cloth

Will you advise us what causes the stains on our cotton cloth like the sample we are sending. What methods can we adopt to eliminate them? (3848)

The stains in these goods appear to be lime stains. Following are two methods the enquirer can try and one or the other ought to enable him to get the goods out without the stains. Thoroughly saturate the goods with water to make sure that there are no dry places; then give a bath of hydrochloric acid at 1½° Tw. Let age for 3 hours, then wash and rinse

thoroughly into kier and make a boiling solution of 1½ per cent. caustic soda and 1 per cent. soda ash, and boil the goods for 8 hours. Wash, sour with the bisulphite of soda, and dye.

If the treatment given above does not eliminate the stains, proceed as follows: Give the goods a lime bath, boil them for 6 hours, then wash well and rinse clear of the lime, wash back in the kier and boil for 8 hours with 1 per cent. of caustic soda and 1½ per cent. of soda ash, not using any bleacher's assistant. After boiling 8 hours rinse well in the kier and wash the goods thoroughly before putting in the dye bath. It is essential that the goods be washed thoroughly before being put in the dye bath. That is where the trouble probably arises at the present time. There are traces of lime in the goods and after being in the dye bath with the addition of the salt it forms an insoluble salt or stain in the cloth that gives it the brown appearance.

If the enquirer will test the stains with hydrochloric acid he will see the lime dissolve. If he will also notice the feel of the goods where the stain is, he will find it very harsh. The above suggestions ought to overcome the difficulty, but if further trouble is experienced we may be able to give other suggestions if the enquirer will state fully what his present process consists of.

Machine for Silk Sweaters

Will you please advise me whether you think a Stafford & Holt 18 gauge, 6 needles to inch, revolving head plain underwear machine would make a satisfactory fiber silk, plaited with mercerized cotton, garment on a 1 and 1 stitch, if locks were tightened up pretty good. My undecidedness was that gauge was too big; also that probably a finer hooked needle might help some. Also advise me what size silk and cotton would be best, and whether a ribbed fabric sweater is in demand. (3856)

The machine is not adapted for the sweater mentioned and, furthermore, there is little demand for such goods at present, although it is expected there will be a better market in a few months. We referred the question to Stafford & Holt, Little Falls, New York, and their reply is as follows:

"We think a machine of this gauge would be too coarse for a silk sweater made on the 1/1 stitch. However, most ribbed fiber silk sweaters are made on the half cardigan stitch, usually about 6 needles to the inch with a 36-gauge needle,

using 1-300 denier silk for the face feed and 2-2/40s mercerized for back feed. We think with a fine hook needle that this would run well on the machine mentioned and that there will be a fair demand for these coats."

Dyeing for Heather Effect on Hosiery

Kindly explain the process of cross dyeing 80 per cent. cotton, 20 per cent. silk to produce the heather effect on hosiery. Can it be done in a rotary machine? (3861)

Heather effects on silk and cotton mixtures can be obtained by making a proper selection of dyes from those that dye cotton in the presence of silk without staining the latter fiber. When there is such a large proportion of cotton (80 per cent.) the problem resolves itself into a cotton dyeing proposition, and without doubt, can be done in a rotary dyeing machine.

For certain shade effects it may be necessary to dye the silk a particular shade before it is knitted into the garment, or it is possible to dye it in the machine the color decided upon for silk, then run off and wash, and cross-dye the cotton. Without having any samples of the shade you wish to produce, formula or recipes cannot be submitted, but, by making a few preliminary trials, you or your dyer should have no trouble.

Recipe for Marking Ink

I would like to ask you if you can give me any information regarding the formula for an ink or dye that may be used for printing on cotton, similar to the lettering which is used on the inside of "linen" men's collars. I understand that this ink is made from a black dye and is printed on the material by machine, after which it receives no further treatment. Any information you may be able to give me will be very much appreciated. (3862)

Inks for marking cotton or linen fabrics, such as collars, cuffs, shirts, etc., must be of such a nature as to resist the action of the usual laundry treatment. Such inks must be prepared with a pigment or insoluble color that is so fine as to either work well within the fibers, or contains a coloring matter that combines with the fiber substance, and forms an indelible mark. The usual aniline black dye will not suffice. An ink, however, is compounded that forms, in time, aniline

black—that is, the true aniline black, which is quite indelible.

As a matter of fact, makers of inks for the collar trade jealously guard their recipes, and it is with difficulty that any one outside of the factories can secure information of value. The following recipe, however, will serve as a basis to experiment upon:

Bluestone (clean crystals)	30.75 parts
Aniline salt	46.14 parts
Dextrine	15.38 parts
Glycerine	7.73 parts
	100.00

The bluestone is ground to a fine powder, as is also the aniline salt. Then both are mixed with dextrine, and afterwards add the glycerine. Finally a sufficient quantity of water is added and mixed in, until the mass has attained the proper degree of smoothness and fluidity.

It is needless to observe that this ink is applied to the collar band by means of a die, to which the ink is supplied through the medium of a felt covered roll.

Another recipe that may serve as the basis of an ink for collars is made up as follows:

SOLUTION A

Copper chloride crystals	4 parts
Sodium chloride	5 parts
Sal ammoniac	3 parts

Water only sufficient to dissolve the above.

SOLUTION B

Aniline salt	40 parts
Gum Arabic	15 parts

For use, equal volumes of each solution are mixed together.

In order to produce a satisfactory working ink, several trials will be necessary, but such inks will be found quite suitable for the purpose.

Colors Fading in Fulling

We are making colored plaids with yarn that is dyed in the package. The color is supposed to be strong for washing and fulling as ordered and as per information received from the dyer. We have now made the first blanket of these samples and some of the colors fade terribly. We are sending you a small clipping showing you how the colors fade. We wish to call your special attention to the rose, yellow and green, of

which colors we are also sending you sample skeins illustrating the colors before being finished.

We would very much appreciate a line from you telling us how we should instruct our finisher to wash and full these goods so that the original color may be retained. We ourselves have washed some sample skeins in very hot water with soap and cannot complain that the colors fade. However, by the finished clipping you will see how the colors lose. (3863)

The difficulty with the bright shades shown on the small skeins submitted is that the colors used do not resist the action of the heat and alkali of your fulling. It will be necessary for your dyer to make a new selection of dyes to meet your special requirements. It does not follow that because a satisfactory condition as to fastness to fulling exists in one mill, that the same choice of colors will pass unaltered through another mill.

The statement that sample skeins washed by you with hot water and soap are not faded leads us to believe that if your finisher would cut down in the use of alkali in the fulling machine, little or no color would be removed.

Tests that we have made with your skeins show that the dyeings are very good, and no doubt if the matter is gone over carefully with the finisher, he will be glad to modify his process to meet the conditions. Clean, bright colors are always more difficult to handle than dull, heavy shades, and the present instance is no exception.

Effect of Cotton on Strength of Union Yarn

We would appreciate it very much if you could give us any definite information as to what varying percentages of cotton added to pure wool yarn would do to the tensile strength. That is to say, start with a pure wool yarn, add a little cotton to the mixture, spinning the same size yarn, what would be the tensile strength of this with the different percentages of cotton fiber added? (3860)

Nothing definite can be given on this question. In a general way it can be stated that mixtures of cotton and wool, up to say a 50-50 mixture, will increase the tensile strength of both wool and worsted yarns. Cloth made of such mixture yarns would also be stronger than pure wool or worsted fabrics, and the strength would probably increase as the percentage of cotton increased, up to 50 per cent. We assume that by wool

yarn the enquirer means worsted yarn, as carded woolen yarns, except when plied, cannot be compared in the matter of strength with cotton yarns or worsted yarns, due to the carded woolen structure. The strength of carded woolen cloth is largely due to the fulling in the finishing process. If the object is to get a strong carded woolen cloth, it is also probably true that mixtures of cotton in the yarn up to 50 per cent. will give an increase in strength.

Dyeing Tinsel Mixed Goods

Will you give me a good formula for jig dyeing tinsel and silk mixed piece goods, and a formula for dyeing tinsel and cotton mixed piece goods? I wish to dye light and dark colors, including black. Of course, I mean to dye only the fabric, meaning the silk and the cotton. Enclosed you will find a sample of the silk and gold tinsel effect after dyeing the silk grey. (3854)

These goods being made with tinsel covered threads, it is necessary that they be dyed in baths that are quite neutral. Any acid present will, of course, act injuriously upon the metal, and ruin it.

The dyes to use are from the direct dyeing group, which only require for their application a small proportion of salt to the bath. The actual dyeing for such goods can be carried out on a jig, in the same manner as cotton and silk brocade effects are dyed.

For light shades upon cotton and tinsel combinations, the dyebath is to be prepared with from 1½ to 3 ounces of soap, and 4 to 12 ounces of phosphate of soda for each 10 gallons of liquor at 160° F. In all cases the dyestuff must be added to the bath in several portions previously dissolved, to insure an even shade. After dyeing, the goods are removed and given a thorough wash in a separate machine, or they may be washed in the same machine, using plenty of water.

In dyeing blacks upon this same kind of goods, the bath must be considerably hotter, and charged with only common salt and the dye. Dyeing is continued just under the boil, and until the cotton is of the proper depth. Where there is such a contrasting color as gold, the depth of black need not be as deep as in other cases, since gold shows up even a deep gray most favorably.

For dyeing a silk and tinsel combination, the bath is made up with direct colors, and with the addition of a small amount

of boiled-off liquor acidulated with a small amount of acetic acid. For very light shades the bath may contain only a small quantity of neutral soap. Enter the goods at about 100° F., and raise gradually to the boil and dye near the boil for about one-half hour. Finally wash well. For bright colors, the use of basic dyes is recommended. These are dyed with boiled-off liquor and a small quantity of acetic acid, commencing at 120° and raising to about 160°, and finishing at the latter temperature.

Black on the silk in such a combination can be dyed with a basic color—such blacks are usually combinations of greens, reds, browns, and blues—or with a neutral dyeing acid color, or an acid color that works on silk in a weak acetic acid bath, such as the old alphanol and anthracite blacks.

The main point in handling this class of goods is to see that the washing is thorough, so that no chemicals remain in the pieces to tarnish the tinsel afterwards.

Fluting Spinning Frame Rolls

Will you advise me how the front rolls on worsted spinning frames should be refluted, and how this work can be done in the mill repair shop? (3858)

The front rolls in frames retain their flutes for several years, and when they require refluting have to be turned down. The rolls become worn in the middle, and are put in the lathe and turned off to a true face. Rolls 4 inches in diameter are the size usually sent out in worsted frames. They may require a reduction of 1-16 inch in diameter, and when starting on this work the frame with the deepest worn rolls should be taken first. The rest of the rolls should all be turned to the same diameter so that when finished the rolls are all to the new standard size. The original flute marks are left in very shallow, and serve as a guide for the refluting. This saves a lot of time as the operator can follow the flutes and retain the correct spacing.

The quickest method of fluting the rolls is to set up an index on the planer and the section with 8 rolls can be planed. The flutes are brought into position by the worm and gear on the index center. It would require a milling machine with a long travel on the table to flute the 8 rolls in one operation. The No. 3 milling machine would travel about the length of 5 rolls. The machine builders use a planer, but with a multiple index,

and can put 4 or more sections on the table at one time. There is a tool for each section and the flutes can be graduated by a master index.

Frames with 144 spindles should not be in the machine shop more than 20 hours, and the cost of labor averages between $40 and $50 per frame. Frequently the clutch rolls are badly worn, and these have to be renewed, which will call for more time on some frames. The clutches have to be bored, shrunk on the shaft, and fitted to the female roll. The planer is the best machine to use for fluting according to the writer's point of view.

When the section is set up on the planer between centers, wooden wedge blocks should be put under the center rolls; this prevents chattering of the tool. The spacing of the flutes must vary, otherwise the leather top roll will be badly cut.

Stains on Finished Elastic Web

I am sending you a sample of elastic web, not finished, and also a piece of the same web after being finished. By holding the finished sample to the light it will be seen that there are streaks in the web. Can you advise what causes these? The finishing mixture we use is made as follows: 5 pounds of gum are added to 15 gallons of water, and the mixing is boiled until the gum is thoroughly dissolved. Goods are submerged in this mixing, then squeezed between rubber rolls and passed around hot drums. (3865)

The streaks are quite noticeable after sizing, and probably are caused by either too much rubber dust being absorbed in the weaving of the web, or the sizing mixture being used too hot, bringing about a little disintegration of the rubber. The gum solution should be used as hot as possible for penetration but at the same time we believe this is one of the causes of the trouble. If the inquirer is weaving the web we would suggest that he have the dust brushed off the rubber yarn as much as possible to prevent its spreading during the finishing process. Also boil the solution thoroughly in mixing, but let it cool off a little before using it on the material. The statement that the goods are submerged is not quite clear. If the goods are submerged and let lie in the hot sizing solution for any length of time, it will probably be found that the trouble is right there. It seems that the stain is from the inside of the goods as it does not show on the surface and only by holding the sample up to the light can it be detected.

Bleaching Cotton Plush with Peroxide

What would be the necessary equipment to bleach 1,000 yards of 27-inch cotton plush, 8 ounces to the yard, by the peroxide method? What would the cost be to bleach the above; that is, material, not labor? We weave approximately the above amount each week and use it ourselves for another line of business, and would like to get away from the difficulties of shipping it back and forth to a bleacher, thus having it on hand when we need it. (3868)

The equipment necessary to bleach 500 pounds of cotton plush per week with peroxide would depend upon whether it is to be divided into five single 100-pound lots, or handled as one 500-pound lot. In any event probably the simplest equipment that would bring satisfactory results would be an ordinary vat and a hand reel. The vat could be constructed of cypress and equipped with a steam coil which should have an inlet and an outlet valve and a false bottom. The cost per pound should be approximately 2½ cents. With larger quantities it would be greatly reduced.

Paste for Labels

Could you send me a formula for making a paste for fastening labels. I have been using a starch paste but this does not keep well. I would like something similar to photo and library paste. I have tried a dextrine paste, the formula for which I got in a photographic journal; this, however, does not congeal and does not stick. (3864)

The common paste as used in drug stores is made by soaking gum tragacanth in water until it has the consistency of boiled starch, and works freely with the brush. It contains a small quantity of carbolic acid as a preservative.

An office paste is made according to the following formula:

Wheat flour	10 ounces
Rice flour	2 ounces
Tragacanth	2 ounces
Water	6 pints

Make a paste with the gum tragacanth and part of the water. Make another paste with the flour and water, gradually raising the heat; and then mix. The flours must first be mixed with the water while it is cold. If the paste is not thick enough, repeat the trial, but use a smaller quantity of water. Several trials may be necessary before the right paste

is obtained. Add as a preservative a small quantity of carbolic acid.

A transparent paste, suitable for affixing labels to glass and other articles is made as follows:

Clear gelatine ..... 5 ounces
Acetic acid ..... 5 fluid ounces
Water, a sufficient quantity, as indicated below.

Soak the gelatine in 6 ounces of water for 12 hours, and heat the mixture in a water bath until the gelatine is dissolved. Add to it the acetic acid, and enough water to make 16 ounces.

Another recipe is:

Clear gelatine ..... 4 ounces
White sugar ..... 2 ounces
Water, sufficient.

Soak the gelatine for 12 hours with 10 ounces of water, and then heat until dissolved. Add the sugar, strain through a piece of muslin, and add sufficient water to make 16 ounces.

Comparative Manufacturing Cost of Cotton and Linen Fabrics

In connection with one of our investigations it becomes indirectly of considerable importance to know in a broad way about what the ratio is between total manufacturing (spinning and weaving) costs of cotton drills and sheetings of the general class known as "heavies," and of similar linen fabrics, of a corresponding grade. After exhausting all the printed and personal sources of information to which we have immediate access without getting much light on this question, it occurs to me that there is probably someone in your organization who could readily give us the answer. If so, will you not kindly thus oblige me. Exact data, while they would of course be of interest, are not essential to the present purpose. What we need is merely the approximate average figure for linen which would correspond with manufacturing costs for cotton goods. (3867)

The manufacturing cost per pound of linen goods is 2½ to 3 times the manufacturing cost of similar cotton goods. The spinning of linen is a much more difficult proposition than spinning cotton. The processes preparatory to spinning are much slower and more expensive, and although linen is stronger than cotton it does not weave so well, owing to its having less elasticity. A weaver on linen could run only about half the number of looms run on cotton.

Wet Finishing Roll

We would like instructions for making a good roll for washers used in wet finishing. We are interested in something that can be turned out in our own repair department. (4015)

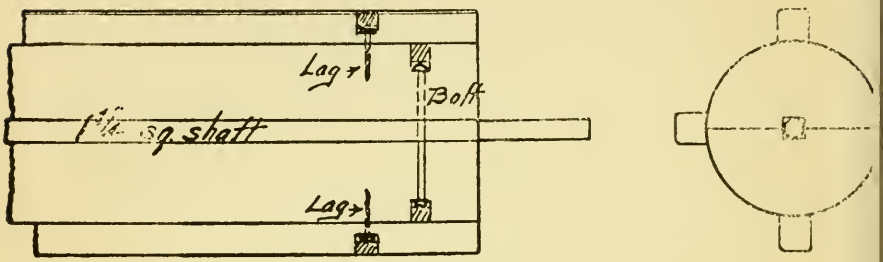


FIG. 1 SUBSTANTIAL ROLL FOR WET SERVICE

The illustrations show details of a good substantial roll for wet service which can be made in the mill repair department when the personnel of the shop is not otherwise engaged.

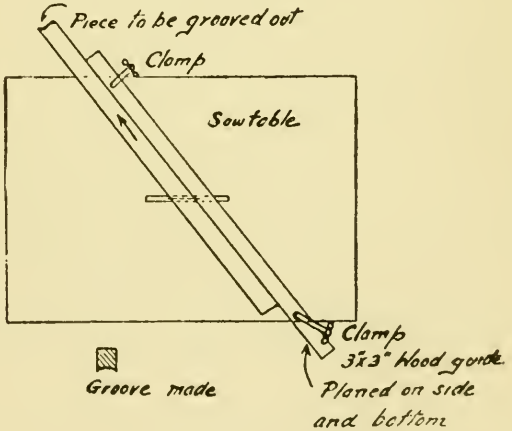


FIG. 2

Turned out in this way the labor cost can hardly be counted. The type of roll shown is largely used on washers, and there are several built-up types on the market. One advantage of the type illustrated is that no screws can come out.

Details of the roll are shown in Fig. 1. Fig. 2 shows how the ribs are grooved out on a saw bench. The saw should be about the same diameter as the roll, and then a close fit is made between the roll and rib. In the built-up type brass screws occasionally work out, and if not noticed, the goods will pick the screws up and numerous punctures in the cloth will result. It is a simple matter to rig the saw table up and the method is fully shown in Fig. 2.

Carbonizing with Aluminum Chloride

Will you kindly let me have a description of the method of carbonizing wool noils with aluminum chloride? (3872)

Aluminum chloride is used quite extensively as a carbonizing agent and is claimed to give better results than sulphuric acid in certain cases. It is milder in action on the fiber than sulphuric acid, as sulphuric acid is a stronger acid than hydrochloric and is not volatile at the temperature of the carbonizing process and therefore remains in the material. The theory of carbonizing with aluminum chloride is that it decomposes at 120° C., giving off part of its chlorine as hydrochloric acid, which is the active carbonizing agent. The carbonizing solution is usually about 8 Bé, but may be set higher if experience with any particular wool so indicates. This carbonizing solution must be kept slightly on the acid side to promote efficiency by preventing decomposition.

Hydrochloric acid will, of course, seriously corrode iron, especially so if there is considerable moisture present and for this reason is liable to seriously corrode the iron fittings of dryers used for drying and baking the stock after impregnating with the aluminum chloride liquor.

If proper care is used in carbonizing with this salt, corrosion of the metallic parts of the dryers can be reduced to a minimum and very little trouble experienced. In the first place, many mills are not properly equipped to successfully carbonize. A great deal depends on the dryers in use and the proper handling of the goods. The goods, after being run for the required length of time in the carbonizing liquor to insure thorough penetration, should be well extracted to remove all excess liquor, and then at once sent to the dryers where they should first be dried at a lower temperature than that used for carbonizing, in order to drive off all moisture, then baked or carbonized at 120° to 130° C. It is of course

essential to have good ventilation in the dryers in order to remove moisture as well as acid fumes.

A great deal of trouble is caused in carbonizing with sulphuric acid, as well as with aluminum chloride, due to the fact that too little attention is paid to the amount of liquor left in the goods after extracting. This is an important point, and should be given careful attention. In order to overcome any tendency toward corrosion of the iron parts of the dryers, the exposed portions could be painted with an acid and heat-resisting paint.

Effect of Dyeing on Weight of Cotton Yarn

A question has recently arisen as to whether a 2-ply yarn which is dyed in the skein or else on a cone will increase or decrease in weight and about how much. The cotton making up the yarn is combed peeler. The yarn is dyed to imitate Egyptian cotton color. I would be greatly obliged for any information pertaining to the above that you may give me. (3886)

There will be a slight loss in dyeing combed peeler yarn to imitate Egyptian cotton. This loss might run from almost nothing to around 5 per cent. The latter amount would probably be lost if the yarn were bleached before dyeing. The loss is due to the fact that waxy matter on the cotton fiber is removed during the dyeing process, while the amount of dyestuff used in dyeing Egyptian tint is very small and can be ignored so far as increasing the weight of the yarn is concerned.

How Textile Workers are Paid

We would like to know by what methods the majority of textile mills pay their help. Do mills that pay for piecework figure by the dozen or gross unit? What number of hours per week is most common on a weekly basis? (3969)

There are two common methods of pay in vogue in cotton mills. A large percentage of the help are paid by the piecework method, the remainder usually receiving pay which is based on a certain rate per hour. The pay of the latter class of workers (or day-help as they are commonly referred to) is customarily figured to the nearest quarter hour. The rates in extreme cases may vary from 10 cents per hour to $1.25 per hour, and are customarily expressed in four places of

decimals, that is, to the hundredths of a cent. Accordingly one man's rate may be $.3188 per hour and another's may be $.4673 per hour.

The hours of labor in textile mills vary in different localities. Probably more plants now operate normally on a 48-hour week basis than on any other. However, working periods of 54, 55, 56, 58 and 60 hours per week still prevail in many places.

There are numerous classes of help paid on the piecework basis, and each has its characteristic unit on which the pay is based. Slubber tenders, intermediate tenders, speeder tenders, and sometimes drawing tenders and comber tenders are paid a certain rate per hank, the number of hanks (which consist of 840 yards of product) being registered by a clock on the machine. These rates are commonly expressed in hundredths of a cent, and will range from perhaps 10 cents to 50 cents or more. The production may run as high as 200 hanks, but usually not more than 130 hanks. Fractions of hanks are usually disregarded.

Ring spinning frames consist of 2 sides each, and spinners thereon are customarily paid a certain rate per hour or per day for each side tended. The number of sides tended would not exceed 14. Such rates on an hourly basis are frequently extended to thousandths of a cent, and may vary from 2 cents to 7 cents per side per hour.

Mule spinners are nearly always on a piecework basis, but some are paid by the hank, others by the pound, or by a certain rate for a box of standard size. The rates and productions accordingly vary widely.

Spooler tenders are usually paid a certain rate per box of yarn spooled, warper tenders generally receive a certain rate per 100 pounds of product, and weavers are ordinarily paid on the basis of a rate per cut or per piece of cloth. In all three cases the rate and the product vary widely according to the class of material produced, the machine speeds, etc., thus making it necessary to know in a general way the character of the product of the mill in question before attempting to name limits as to productions and rates.

Card-room workers in woolen and worsted mills are generally paid by the day. Spinning-room workers are commonly paid by the pound. Weavers are paid by the cut or piece of cloth, the rate being based on the number of picks per inch. Loomfixers and other general help in the weave-room are paid by the day, but it is very common for loomfixers to receive a

bonus on the weaver's production. Finishing and dye-house workers are practically all paid by the day.

In the underwear knitting mills the help in the knitting department is paid sometimes on a day basis and sometimes on a piecework basis, depending upon whether the work is frequently changed. When long runs on the same class of material are common, piecework rates are worked out based on the poundage. In winding the yarn preparatory to knitting, piecework is most common, the work being paid according to the sizes of yarns being wound. The rates, of course, are based on the yarn sizes, the finer yarns carrying higher rates. Finishing department workers in underwear mills are practically always paid on a piecework basis, the unit being a dozen. Dyeing and bleaching department workers are paid by the day. In hosiery knitting mills, practically all employes are on a piecework basis, the unit being a dozen pairs of hosiery.

Holes in Finishing Jersey Cloth

We are enclosing two swatches of our jersey cloth and would ask you to kindly explain to us what causes the holes. Are they due to moths or are they caused by chemicals used in dyeing? We have made up a number of pieces from exactly the same lot of yarns and at the same time, eight of which we forwarded to our dyer and finisher. Upon receipt of these pieces we found that seven were satisfactory and the other one was full of these holes. (3874)

We have examined the two swatches carefully and would pronounce the cause of the holes to be mechanical rather than chemical. The type of hole in the green swatch is commonly known (in mill parlance) as a mill hole, or to be more explicit, a fulling mill hole. The holes in the black piece could have been made about the time the goods were ready to come out of the fulling machine, or may have been made in the cloth washer. None of the holes in either piece could have been made in the dye kettle, or by chemicals.

There are so many ways in which holes can be made in jersey cloth, perhaps more than in any other fabric, that unless we were on the spot to see the conditions existing, it would hardly be fair to the dyer and finisher to express a set opinion in this particular case. However, we might in a general way enumerate a few of the causes of such holes. We will place them in four classes: Accidental, purely mechanical, carelessness, and ignorance on the part of the man in charge.

Accidental holes may be caused by some hard substance, such as a nail, an iron nut, a turning chip, a cutting from pipe threaders, a stone, cinder, or pebble getting in the fulling mill. If wood rolls are used, any of these foreign substances may become imbedded in the roll and at every turn of the roll punch a hole in the cloth. Sometimes a needle (knitters or sewing) will go in with the piece, and should it get fastened in a crack in the bottom of the mill, with point protruding, the result will be many slit or ripped holes.

Purely mechanical holes are caused by an improper adjustment of the trap and brass plate to the face of the roll. If set too close, the goods will be squeezed down between the roll and plate and before they release themselves there may be many "pinch" holes throughout the piece. It is always best to set the plate about 3/16 inch away from the roll, so that when the goods are punched through and down, they will draw themselves out again without injury as they are forced through the trap.

Carelessness in soaping very often causes holes, especially in jersey cloth. This fabric is so sleazy as compared to woven goods, that the greatest care must be exercised to bring pieces through the fulling process without injury. One quart more of liquid soap than they ought to have will often cause them to stick to the roll and jam them between the roll and plate so continuously that they are just ground and pinched full of holes.

Ignorance on the part of the man in charge has cost mills many dollars, as damaged cloth runs into money quickly. A man sometimes imagines that he knows all there is to know about fulling and fulling compounds. He makes up a soap solution that would take the skin off a badger's back and applies it to good cloth, and then wonders why so much trouble occurs. We have seen fulling mill rolls so gummed up from such a solution that it was impossible to get a piece of goods through without scores of holes. The reason for this is that the hot caustic in the soap solution dissolves a certain percentage of the wool in the goods; the combination of caustic and dissolved wool creates a gum that is so sticky and clings to the rolls so tenaciously that the goods in turn stick to the rolls and instead of shooting through the trap, they go down where the pinching is good and the man in charge, not knowing, takes the mill apart time and again, but never discovers the why and the wherefore.

Accidental holes are also caused by a nail, tack or some

other hard substance becoming imbedded in the washer rolls. The holes in the black piece would convey the impression that they were made in this way, because they are not felted around the edges as they are in the green sample.

Painting Iron Starch Tank

We have an iron starch tank which we intend to use for mixing our size solutions of starch. What would you advise painting or coating the inside of this tank with to prevent rusting? (3879)

The iron starch tank should be thoroughly cleaned out and no painting or coating should be put on the inside. If the tank is to be used daily for mixing and boiling size there will be no trouble from rust. Hundreds of plants are using iron kettles to-day. Kettles can also be bought with copper lining, and these, of course, are rust proof. Jacketed iron kettles can also be bought and with this type the size is not weakened by the condensed steam.

A superintendent replies to this question as follows: If I were going to use an iron tank for sizing solutions I would not have it painted at all. I would wash it out well every night and leave it clean and dry. This will give less trouble than painting it. The changes of temperature that the tank is subjected to will, I am sure, affect any paint that may be used, and give trouble in the sizing. It will peel off and rust will break through. There would be considerable expense to keep the paint renewed. On the other hand a little time each night to clean the tank out and rub over the surface with softener will ensure satisfactory results. I have had trouble with iron starch tanks that were painted and had the trouble of cleaning off all the paint and adopting the above method. Perhaps the best method is to line the inside of the tank with a thin lining of sheet copper. The first cost is the entire cost and it will prevent trouble with any kind of size.

Tensile Strength Standards for Woolen Suitings and Overcoatings

The question has arisen between us and some of our customers who purchase piece goods as to what is the minimum satisfactory strength per inch of warp and filling in men's cassimere suitings and overcoatings. We are not aware that there is a definite and accepted standard, but presume there must be a general consensus of opinion as to the necessary

strength to make merchandable, satisfactory cloth for men's wear. We will thank you to write us such information as you may have on the subject. Recently some goods have been rejected of 25 pounds to the inch in warp and 30 pounds to the inch in filling, and it is our opinion in a case like this that the cloth is as strong as should be required. (3903)

The enquirer is correct in assuming that there is no definite and accepted standard of tensile strength for men's suitings and overcoatings. Whether the cloth is strong enough is a question generally decided by the mill and the buyer by the rough method of testing the cloth with the hands. In this way experienced manufacturers and buyers determine whether the strength of goods is sufficient to answer the purposes to which the goods are to be put. Generally the mill wishes to have a wide margin of safety, and the goods are stronger than are actually required. It would be hard to establish any standards of tensile strength because fabrics and materials vary so widely.

In at least one case, a large mail order house requires all of the cloth purchased for men's and boys' suitings to have a minimum tensile strength of 50 pounds in both warp and filling. We understand that the grab method is used in testing these goods. This, of course, gives a higher tensile strength for the goods than would be given by the strip method of testing.

Some idea of United States Government goods can be obtained from the specifications for various cloths for army and navy use. In a specification for a woolen cloth known as dark blue cloth 54 to 56 inches wide, 17 to 18 ounces per linear yard, 3 harness twill, 3,024 ends in the warp, and 58 picks per inch in the filling, the tensile strength required is not less than 44 pounds to the inch in the warp, and not less than 40 pounds to the inch in the filling.

The cloth known as sky blue kersey, 54 to 56 inches wide, weighing 22 to 23 ounces per linear yard, woven with a 4 harness twill, 2 up and 2 down, with 2,700 ends in the warp, and not less than 55 picks to the inch in the filling, is required to sustain a tensile strength of not less than 65 pounds to the inch in the warp and not less than 60 pounds to the inch in the filling.

Another Government cloth known as 16-ounce olive drab melton is required to sustain a tensile strength of not less than 40 pounds to the inch in the warp and not less than 35 pounds to the inch in the filling. This fabric is 56 to 58

inches wide, weighs 15½ to 16½ ounces, is woven with a 4 harness broken twill, 2 up and 2 down, and has 2,680 threads in the warp and 46 picks to the inch in the filling.

A heavier melton known as the 30-ounce olive drab melton woven with a 6 harness broken twill, 3 up and 3 down, with 2,520 ends in the warp, and not less than 42 picks per inch in the filling, is required to sustain a tensile strength of not less than 90 pounds to the inch in the warp and not less than 70 pounds to the inch in the filling.

From the above the enquirer can get some idea of the opinion of army officers as to tensile strength requirements of clothing fabrics. These Government cloths are required to withstand more severe uses than the average civilian purchaser requires of his clothing, and the tensile strength requirements may be considered high.

Streaks in Carbonized Piece Goods

I would like information on carbonizing woolen piece goods, 54 inches wide finished, which are made mostly from shoddies. The reason I ask this information is this: I am employed here as second hand in the dye-house, and have direct charge of the piece goods dyeing. We have been troubled with cloudy and streaky pieces which I have traced directly to the carbonizing. That is to say, the acid has not been evenly got out, and causes the goods to come out as above. They always seem to be darker on the sides. The finisher does the carbonizing and the method he uses is this: He steeps the goods in an open vat which twaddles 8 per cent. and when ready to take out runs the goods through a pair of narrow squeeze rollers which cause them to come through in folds. Then he has only been running them in the extractor about 5 minutes, which I do not think is long enough. Then they are dried in the usual way. Would appreciate any information on this subject as it has caused an endless amount of trouble, the finisher not seeming to care to alter his system. (3873)

To properly carbonize woolen piece goods requires that the pieces be passed through a weak acid which, for convenience, may stand at 5½° Tw. This solution is contained in a lead-lined tank. The cloth is passed through the acid at such a rate as will permit of its thorough saturation, then it passes through squeeze rollers to remove the excess of liquor. These rollers must be well lapped so that the "squeeze" will be even and at the same pressure at every point of the surface. It is not good practice to pass the cloth through the "nip" in folds,

because the pressure is then unequal, and streaks will surely show later. After squeezing, the cloth passes through the carbonizing dryer at about 195 to 205° F., and afterwards is dry milled, or otherwise handled.

Before dyeing, the cloth must be neutralized with soda in a washing machine. The strength of this soda solution, as used by the writer, stands at 5½° Tw. Usually 2 to 2½ gallons will be required per piece, but to make sure that a sufficient amount of soda has been added, always test the liquor in the machine with a piece of red litmus paper. If this paper turns blue after the pieces have run for a short time, the neutralizing is finished, and the cloth is then ready to be washed.

If the carbonizing acid is not completely "killed," the soap used in the milling is partially decomposed wherever it comes in contact with any remaining traces of acid, causing a deposit of fatty acids from the soap, and it is these deposits of fatty acid that cause the streaks to show in the finished cloth.

If the enquirer's figure is correct, viz., eight (8) per cent., which equals ten (10) degrees Tw., this strength of acid, presumably oil of vitriol, is entirely too strong for the work, and it is easily seen how streaks, if not other damage, might occur to the goods.

As to the machine, narrow rollers should not be used; but perhaps it is not possible to increase their length, owing to the narrowness of the acid tank. Carbonizing full-width is always the most satisfactory.

Measuring Hosiery

Please advise method of measuring length of foot of hosiery form, taking into consideration the various depths of instep and angle of foot as related to leg. Also how to determine length of leg in the different sizes, men's and infants' socks from heel to transfer point and how long tops should be. What is the difference in full-fashioned and seamless shaped forms? (3896)

A mill man to whom this was referred replies as follows: Our practice invariably has been to make the hosiery measure the exact size in inches after it has been finished and is ready to be boxed. To attain this result allow a little for the contraction of the stockings after being stripped from the form, allowing a little more for woolen and worsted hosiery than for cotton and silk. The manufacturers of hosiery forms will gladly furnish the right allowance for the particular kind

of hosiery for which they are designed. We measure our feet on all kinds of hosiery from the point of the toe to the back of the heel and would recommend that your enquirer take a box of high grade hosiery of standard make and try them out with common 12-inch rule, putting the 1-inch end at the point of the toe and noting length at back of heel.

In knitting, our method has been to make the stockings about one-half size larger if they were to be dyed in the piece, and then watch the results with a sample dozen of hose.

For length of leg we knit our lengths to suit the form we adopt. There is very little difference in the lengths of size 10½ and larger; while the variation in length of leg is approximately ¼ inch for sizes smaller. Care should be taken that the cuff top should not come down on the enlargement of the leg form to cause the cuff to flare appreciably.

We do not manufacture the very small infants' hose, but for all stockings in small sizes and larger we follow the old rule, "the leg to be three times the length of the foot." Ordinary styles of these stockings have 12 or 14 courses from heel to transfer point. Cuff tops for men's half-hose should finish about 5¼ inches in length, but, frankly, we fear that not all in the market are up to this dimension. Since frequently the cuff is not made of quite as high priced material as the rest of the stocking it would seem to be practical to knit it of the required length when a given weight per dozen must be met.

All ordinary hosiery forms have round edges and our shapes are practically the same for both the full-fashioned and seamless hosiery.

Dressing Linen Yarn

We are having some trouble in dressing our linen yarn, and will appreciate your suggestions as to what our trouble might be. The yarn between the dressing rolls twists as many as five and six strands together and after leaving the dressing rolls, considerable breakage ensues. We are dressing a 20-lea tow yarn twisted 10 turns per inch. (3908)

The trouble referred to is probably caused by some of the following conditions: Warper beams not having enough tension on them; not having enough dresser reeds in the dressing machine; not having enough lease rods to separate the yarn as it comes off the beams.

Linen yarn, when it is wetted by the starch solution, has a tendency for the different threads to twist around each other,

but this is easily overcome if proper attention is given to the process. The lease rods used should be about 1½ inches in diameter, and the dresser reeds are heavy special reeds for dressing purposes only. The set of the reeds should be suitable for the set of the cloth to be made. Ordinary reeds can be used successfully, however, if the proper kind is not available.

Stock Sticking to Spinning Rolls

We are troubled in our spinning department with some ¼ blood stock (white top), which constantly keeps lapping around the iron roller. Grease seems to accumulate on the bottom roller and this picks up the thread and takes it around with it. Can you offer any suggestion to remedy this? (3888)

It is our opinion that the stock is coming gummy from the scouring-room and this should be remedied first of all. A spinner suggests putting some kerosene oil on the top rolls which will help to loosen the gummy substance from the bottom rolls and can be cleaned off very easily. He recommends applying the oil three or four times a day until the rolls are thoroughly cleaned, and after that once or twice a day.

"Cloudy" Knit Fabric

Enclosed is sample of 220-needle hosiery made of 50/2 combed peeler mercerized yarn. You will observe that there are cloudy places in it, running with the courses. When the goods are finished these places show up more plainly, as if the goods were thick and thin in places. What is the cause of this?

Also tell me if the proportion of wales and courses are right, i.e., is there the proper tension on the yarns? In your judgment is this a properly knit piece of goods? (3907)

This fabric seems to be knit all right, with the right number of courses and the proper tension on the yarn. We see plainly the cloudy places running with the courses that the enquirer mentions. The cause of this may be several things, the first and most probable of which is that the cone of yarn used to knit this fabric pulls hard at different places. In other words, the yarn will run off smoothly in some places and at other places will pull hard, causing tight or loose places in the fabric.

If the enquirer wants to test this out to find if this really is the cause he should backwind a cone of yarn before putting it on the knitting machine. If the cloudy places still appear, then the only other cause we think of is that his stitch cam is too close to the end cam, causing the needle, when it leaves the stitch cam, to retard and if the stitch cam is too far away from the end cam the needle will be too loose and will cause the trouble.

We would suggest that the enquirer backwind several cones of yarn and try them out first, as this is the most probable cause. If it does not help, see that the stitch cam and end cam are adjusted so that the needle will pass from one cam to the other properly without either too loose or too tight adjustment.

Scroop on Mercerized Hosiery

We have an inquiry from one of our good friends in Nicaragua, who is a manufacturer of hosiery, for the process and the substance to be used for giving mercerized cotton a similar scroop to that of silk hosiery. We would be much obliged if you would give us the necessary information. (3905)

Any means of imparting scroop to mercerized cotton must be done without oil or soap. Soaking the hosiery in a 5 per cent. solution of tartaric acid for half an hour, and then drying, will impart a fine "scroop." A process said to be very good is based upon the use of boric (boracic) acid. The goods are passed through a bath containing 10 pounds of boric acid, squeezed and dried. It is said that results obtained by this method are quite comparable to silk. Also that colors are not affected as is the case if tartaric acid or some of the other "vegetable" acids are used.

Selvages for Velours and Broadcloths

In your opinion what is the best material and weaves for selvages of velours and broadcloths made as follows:

VELOUR

3,200 ends, 1/30 worsted warp, 64-inch reed space, 42 picks per inch, 1/22 cut filling.

BROADCLOTH

3,800 ends, 1/30 worsted warp, 67-inch reed space, 50 picks per inch, 1/22 cut filling.

Weave, 3 harness warp flush twill. (3881)

In our opinion it will be best to use the same sort of yarn for selvages as is used for the body warp, but doubled 2-ply, and weave with the regular plain weave. Odd or left-over yarns of approximately the same quality and size may be safely used for the purpose. This helps to get rid of undesirable accumulations of yarns. The selvages in this case should be sewed together before wet finishing.

Singeing Misses' Ribbed Hosiery

Will you please advise me if singeing will add to the market value of misses' ribbed hosiery? We are thinking of buying a singeing outfit and before doing so we will be glad to have your views on the subject. (3906)

Singeing misses' ribbed hosiery is almost a necessity in these days, in order to compete with other mills. It improves the stocking greatly. A knitting mill superintendent replies to this question as follows: If the enquirer is using a soft yarn, singeing will add greatly to the appearance of the goods, and they will command a better price. The process of dyeing raises a nap on yarns of that nature which singeing removes, giving the goods a smooth finish.

Drying Glove Fabric

Enclosed find sample of glove fabric. The cloth has been shrunk and dried on pin tenter frame. The tenter opens out the cloth, taking the body out of the cloth, also reducing the required amount of elasticity. Would like to know how to dry it to hold the body and elasticity. (3899)

Drying on a tenter frame should not take the elasticity out of the goods provided the frame is not set too wide. If the top and bottom row of pins are too far apart, then there is too much stretch put into the pieces with the result that the dried fabric is "dead." Drying on cans is less likely to take the elasticity out of goods such as the samples, and it is quite likely that that method of drying is done in some mills. If the goods are subjected to too great stretch during the drying operation, loss of life and elasticity will surely result. Try drying over cans if you have them, or, if drying on a tenter must be continued, try setting the rows of pins closer, until a distance is found that will permit the goods to be dried to just the proper width without loss of stretch.

Derubberizing Cotton Goods

Kindly tell me how to derubberize a piece of waterproof cotton goods in order to ascertain the construction of the goods. (3887)

The best solvent for rubber is solvent naptha, obtained from coal tar, and it should not contain any benzol. If this product cannot be readily obtained, try digesting the rubberized fabric in turpentine. This latter substance, though not used industrially as a rubber solvent, has very distinct solvent properties. To use it, the cloth should be placed in a dry glass flask, well covered with turpentine, and the flask then placed in hot water (not over a flame) and allowed to remain heated for some time. If the rubber is not completely dissolved, pour off the old turpentine and replace with fresh. Another solvent for rubber is aniline oil. This is used exactly as described for turpentine.

Steam Pressure for Sponging

Our garment factory plans to put in a sponging machine to sponge the pieces before being cut up and there is a slight difference of opinion as to the steam pressure to be used when sponging. My idea is that if we use too high a pressure the steam is too dry to sponge well and there is danger of injury to the colors; but I have no experience in sponging machines and any information you can get will be very highly appreciated. (3914)

Sponging houses use from 50 to 60 pounds of steam in most cases on the steam sponging machines. We have heard of spongers in New York City who have been known to run with a low pressure boiler of not over 20 pounds. If the steam is too high pressure, there is a tendency to shrivel the goods. At the same time with a low pressure it is sometimes necessary to install separators to keep out a surplus amount of moisture.

Knitting Hard Twist Lisle Yarns

We are having some trouble knitting fine lisle yarns because of the fact that they kink rather badly due to the hard twist. It has been suggested that we use paraffin oil, also a mixture of paraffin oil and cocoanut oil. We would appreciate it if

you would advise us what experience you have had with the use of cocoanut oil for this purpose. (3916)

The general method in some parts of the industry is to use a mixture of paraffin and cocoanut oil made up into cakes, which are used on the small turn-table attachments on winders. This method allows for a considerable variation in the amount of material put onto the yarn, and also in the kind of material, as more or less cocoanut oil can be used.

This treatment undoubtedly overcomes a lot of the trouble, especially in harsh yarns such as bleached, but we also find it helps in knitting common single carded yarns in fine numbers. It may overcome the trouble due to excessive twist but we have lately found that we have better success in eliminating twist by running the winder bobbins the opposite way. This was on 13 single carded, where we did not get the results from paraffining the yarn, and the same might be true with the lisle.

It would surely pay to try it both ways to see which gives the better results. With the modern paraffining attachments it is not a hard matter to oil the yarn in the winding process and it usually pays, even though the yarn is right in the first place. We use about 1 part of cocoanut oil to 14 of paraffin.

Clocking on Hosiery

Can you give me information as to what make of seamless machine the clock stocking that is seen so much now is made on? It is a black silk stocking with a white clock worked into it. Can you tell us the price of these machines? Are they made in 240-needle, 3½-inch? Are they spring beard or latch needle machines? What production can be done on these machines on ladies' silk stockings, 20-inch boot, mercerized top, heel and toe, and how soon could we get some of these machines? (3904)

So far as we know machines are not on the market for producing this knitting work complete. Machines for this sort of work are built for the special use of two mills. There are other mills running what is now considered an old style revolving cam-head machine that makes a straight-line effect by revolving a small bobbin of the color desired and raising two or three needles with special butts high enough to take this yarn at the required time. To the straight-line effect, the finish at the top is added by hand.

Other manufacturers are getting a similar effect by embroidering on machines supplied by either the Merrew Machine Co., Hartford, Conn., or the Union Special Machine Co., Chicago, Ill. For knitting-in the clocking, it appears that this work can be done more easily and to better advantage on the old type revolving cam-head machine.

Weaving Gros Grain

Find enclosed sample of gros grain. Note the rough appearance. I have made various attempts to make this cloth but seem always to produce either a soft ribless cloth or a harsh cockled one like this. If there is any way to make this right by changing the throwing, dyeing or loom adjustment, I would be glad to learn of same. (3920)

In the sample of gros grain submitted, the filling appears to be composed of one end of about 6-thread tram, made from 13/15 denier raw silk, 3 turns of twist per inch, dyed souple, and weighted with tin. The warp seems to be composed of 280 ends per inch, reeded 70/4 of 2-thread, tin weighted organzine. This warp is all right.

Where a firm, full, well stuffed rib is required, such as is needed in gros grain, it is not customery to use a single thread of tram. Two threads of tram are generally doubled together, and woven in for the filling, so that we might have a filling composed of 2 ends of 4-thread, 4 ends of 2-thread, 3 ends of 2-thread, 3 ends of 3-thread, etc.

When 2 or more threads are wound onto a quill, as the thread draws off from the end of the quill in weaving, twist is necessarily imparted to the thread, which interferes with the true and level effect desired in the goods. Hence, if the material is quilled from bobbins standing vertically, some twist in one direction may be thus imparted to the thread on the quill, and if then it is so wound on the quill that the twist introduced into the thread in the weaving will operate in the reverse direction, this undesirable effect can be somewhat minimized.

In regard to the quilling, certain quilling machines are offered by the makers specially arranged for gros grain work, an inquiry as to what machines are available may profitably be made from the representative makers of such machinery.

The warp should be very carefully made, and picked extra clean, as everything shows on the face. Such warps will be

mounted in looms with eccentric cam gear motions, working up and down at the same time. Whatever arrangement is used, the idea is that when the shed is being formed, the threads that are to stay down will be drawn down below the level of the warp to just the same extent that the upper threads are raised above the level of the warp.

If your correspondent will follow the above suggestions looking towards getting a double thread for his filling, and this double thread with as little twist in it as possible, and the arranging of his warp so that there is an even tension on both sides of the cloth as the weaving proceeds, I think that he should be able to eliminate much of the trouble which he is experiencing.

Knitting Artificial Silk

Enclosed you will find sample of fabric made from artificial silk which our selling agents have asked us to look into. Will you kindly give us the benefit of your expert's knowledge of the proper method of producing this on a spring needle machine? We understand the width is immaterial so long as we get approximately the same weight per square yard. Our great trouble in handling artificial silk on a knitting machine has been to hold the yarn properly on the needles and to prevent drop stitches, which run considerable length into the cloth before they can be stopped. Do you know of any particular style of needle which is used for this class of work? We use the Crane spring needle machines. (3919)

Needle manufacturers will make a needle that has the crimp very close to the shank if so ordered, and this will help some in stopping the drop stitches, but probably the best way is to use a flat presser instead of the round one. This flat presser will reach up close under the sinker burr and close the beards before the silk has time to spring out.

A mill man replies to this question as follows: There is no hard and fast rule for running this silk on knitting machines. No two men have the same ideas. For instance, some knitters run wet and others damp or dry. A tight or fairly tight crimp needle is generally used, and no tension of any kind on the silk. The sample could be made a trifle heavier by tightening stitches; this would hold in needles better. A stationary presser is best. Personally I never had what could be called a perfect roll of silk, even by running on and mending on machines, stitch by stitch. Perfect winding is neces-

sary for even tension. About the best advice I can give is to have a man experienced on this silk to help out, for no man at a distance can say as to the particular condition of any certain machine.

Cost of Beaming and Weaving

Enclosed please find sample of awning material, 44 warp and 38 filling threads per inch. The warp threads are 12s and the filling 14s yarn. Will you kindly inform us the cost of beaming and cost of weaving? We trust you can at least approximate the costs. (3918)

Any reply to the foregoing question can only be an approximation, since the enquirer has neglected to state in what width the goods are to be woven. For this reason the figures can only be given in the form of costs per yard. We presume that the yarn is received on spools or tubes and is to undergo the processes of warping, slashing and drawing-in prior to weaving. It should be understood that the following figures contain allowances for all overhead items, including depreciation on buildings and equipment and interest at a reasonable rate on the capital invested.

At the present time the cost of operating a warping department including both overhead and labor amounts to about $20 per warper week. The production of a warper should provide for about 12,500 yards weekly of the cloth in question. Dividing $20 by 12,500 we have $.00160 as the cost per yard for warping.

The present cost of slashing for overhead and labor is in the neighborhood of $100 per slasher week. The slasher should produce sufficient warp for about 40,000 yards of cloth weekly. Dividing $100 by 40,000 we have $.00250 as the slashing cost per yard.

The pay for the drawing-in of warps varies greatly, especially when the work is done by hand. A cost for this process of $.00150 per yard would probably be a fair representation of the cost of hand drawing-in in the average mill. If the warp were drawn in on an automatic warp drawing machine, the cost would be less than half as much as for hand drawing.

The weaving costs, exclusive of the weaver's pay, but including overhead and incidental labor, would amount to probably $2.50 per loom week. The loom might produce about 180 yards per week. This would give a general weav-

ing cost of about $.01389 per yard, exclusive of the weaver's labor.

On goods of this character a weaver would run not more than four looms, and the piece rate would be so fixed as to afford him at least $30 per week for a reasonable production. This amounts to $7.50 per loom week. Dividing $7.50 by the production of 180 yards weekly, we have $.04167 as the cost per yard for the weaver's pay.

Summarizing the foregoing figures, the results are:

Warping cost	$.00160 per yard
Slashing cost	.00250 per yard
Warp drawing cost	.00150 per yard
General weaving cost	.01389 per yard
Cost for weaver's labor	.04167 per yard
Total cost for beaming and weaving	$.06116 per yard

These costs could be materially reduced if the weaving were done on automatic looms equipped with warp stop motions. The weaver on automatic looms would receive about $40 weekly for tending about 20 looms, a cost for weaver's pay of about $2 per loom week. Due to the decreased number of stops the looms would probably produce about 240 yards per loom week. Dividing $2 by 240 we have $.00833 as the cost per yard for weaver's labor.

The increased amount of capital invested in the automatic looms, the increased amount of power, floor space, supplies, etc., required for automatic looms and the higher wages paid loom fixers, together with the additional general help in the form of filling boys, etc., required by the operation of automatic looms would increase the general weaving cost about 33 per cent. or to $.01852 per yard.

The costs, using automatic looms, would accordingly be as follows:

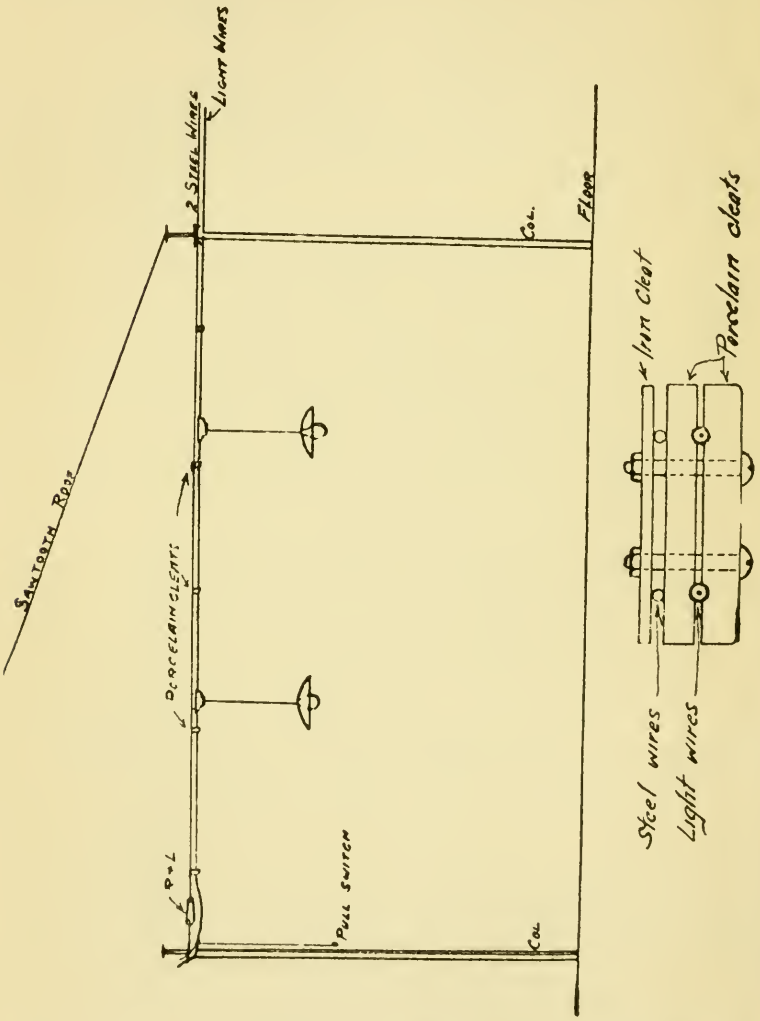
Warping cost	$.00160 per yard
Slashing cost	.00250 per yard
Warp drawing cost	.00150 per yard
General weaving cost	.01852 per yard
Cost for weaver's labor	.00833 per yard
Total cost for beaming and weaving	$.03245 per yard

It should be understood that in all the above estimates it is taken for granted that the work is to be done in a mill of average size. If the operations are to be conducted on a smaller scale the costs will necessarily be somewhat higher.

Electric Light Wiring

Some time ago you had an article describing a method of electric light wiring for wide bays in sawtooth roof buildings. Could you send us the information given in this article?

(3913)



METHOD OF WIRING FOR ELECTRIC LIGHTS IN BUILDING WITH SAWTOOTH ROOF

The article referred to by the enquirer is as follows: The wiring of wide bays for electric lighting presents a special problem, particularly under a sawtooth roof. Should any wide supporting material be used, it will cause shadows

which are always objectionable in mill rooms. The accompanying sketch shows a method the writer has used. Wiring is economical to install by this method, and can be removed very easily if changes in the lighting arrangements are made necessary by future relocation of machinery in the plant.

The bays in the room illustrated are 22 feet on centers. The lines are operated by pull switches on the feed end of the lines as shown. Switches can also be installed on each light if the machines are not in constant use. The steel supporting wires can be either solid or stranded, and they are pulled tight by means of a rope block. When all the slack is pulled out of these supporting wires they are tightly stapled to the beams in a building of the standard mill construction. Where steel beams are in use the strain is taken up with rope blocks, and then right and left screw tighteners are fastened to the wire and the end beam. When the rope blocks are taken off the remaining slackness can be taken up by means of the right and left screws. The supporting wires are clamped to the intermediate beams. There will be no deflection when the light wires and pendant lamps are attached.

The plates are made of strip iron about ⅛ inch x ½ inch section, and small bolts are used to fasten the cleats together.

This arrangement can be put up quickly and will not interfere with the light in any noticeable manner. It will also be found of great advantage where a temporary line of lights is to be installed. The lamps may be hung at any desired point, the wire being cleaned of insulation and the rosette fastened on in the usual manner. Where all the lights are to be used there is no need of switches on the individual lamp sockets.

Hank Clocks on Drawing Frames

Does the use of a hank clock on the drawing frames improve the efficiency of the drawing department to any great extent? Many mills consider drawing a department which can be run any old way provided it keeps the slubber supplied with sliver, and thus claim there is no advantage in the hank clock. We seem to think, on general principles, that this is poor efficiency and the piece basis should be worked out if practical. (3924)

Many mills have applied hank clocks to the drawing frames with very successful results. The piece-work method of paying the drawing-frame tenders has quite generally led to higher production per delivery and per operative.

As the enquirer indicates, the value of such procedure is not so marked in a mill which has ample drawing capacity as in the plant which has difficulty in getting the work through the drawing processes. In the latter case, however, it is frequently found that the paying of piece work based on hank-clock readings enables the department to reduce the number of drawing tenders required to put the work through, thereby effecting a reduction in the payroll, while frequently providing a larger weekly pay envelope for the operatives remaining. At the same time it may become possible to shut down some deliveries, which would effect certain, though small, savings in power, supplies, etc.

The progressive manufacturers are realizing more and more that the breaking strength of the yarn is affected materially by the speed of the drawing processes; that is, that a reduction in the speed of the drawing frames frequently improves both the quality and the strength of the resultant yarn. The use of the hank clocks and piece rates at the drawing frames should make it possible to put the same bulk of product through the same number of machines at a reduced speed. Many manufacturers would prefer the advantage thus gained to the moderate payroll reduction which would ensue were the former rate of speed maintained.

A further advantage of the use of hank clocks is that they provide another record of the production, which may prove of value when compared with the records of subsequent processes and departments.

Careful supervision of the process should be provided if hank clocks are installed, in order to prevent the operatives interfering with the stop-motions and running the frames when ends are down at the back or when other undesirable conditions exist. This would probably require no more effort than that which is now necessary to keep the help on the job while an hourly rate is paid.

Lime and Caustic Boils for Cotton Piece Goods

I have just entered the textile field and am establishing a laboratory for chemical analysis and process control for a cotton mill. I have read the back numbers of your journal for this year and noticing your question and answer column, I am going to take advantage of it.

1. What are the essential advantages or disadvantages of the lime boil as compared with the caustic boil in the bleaching of cotton goods?

2. What schedule of boiling and what strength of solutions would be required in bleaching sheeting, using the caustic soda boil. (3932)

1. The essential advantages of the lime boil as compared with the caustic boil are that on fine quality white goods, such as muslins, sheetings, pillow case fabrics, etc., it is a generally understood fact that the trade demands a lime bleach, consisting of one boil with lime and a second with soda ash. The results from this type of boil are much better than what can be obtained with caustic soda. So far as quality is concerned, the tone and color of the white is much clearer and brighter, and the texture or feel of the goods is more mellow and smooth. The disadvantages of the lime boil as compared with the caustic boil are that the process is more expensive, requires more boil in the kier, and also closer supervision on the part of the bleacher in order to avoid stains, etc.

2. The schedule of boiling or bleaching sheeting with caustic boil will be governed according to the quality of the goods. Some bleacheries on low or medium quality fabrics are using the single caustic boil of 10 to 12 hours with about 3½ per cent. solution of caustic soda. Where a little better results are required, it is customary to give two 8-hour boils with 2 to 2½ per cent. caustic soda in each boil.

The enquirer may be interested to know that the best-known concerns throughout the United States, producing the highest quality of bleached sheetings under trade names, generally will not consider the replacing of lime bleach by caustic bleach, as they claim that their product sells more readily and gets them a better price when bleached with the lime process.

A bleacher replies to the question as follows: The advantages of a lime boil as compared to a caustic boil is a better and a lasting white, which does not turn yellow if the goods are bleached right, a softer and a mellower feel to the goods, with less danger of having tender cloth in the process of handling. The disadvantages of the lime boil are that it requires more time and labor in handling the goods in process and more fuel and steam.

The second question is rather indefinite as the enquirer does not state the weight of the sheetings nor the kind of kiers used. The strength of the solutions vary and the length of time to boil and the pressure required vary according to the weights of cloth being handled. For a lightweight sheeting, a caustic soda solution of 1 to 1½ per cent. of caustic to the

weight of cloth in the kier would be required; while heavy sheeting would require 2 to 2½ per cent. of caustic soda. The boiling of the goods would require a similar change of time and pressure; lightweight sheeting being boiled, say, 7 to 8 hours at 20 to 30 pounds pressure; heavyweight sheeting being boiled 9 to 10 hours at 30 to 40 pounds pressure.

These changes have to be handled in a careful manner and can only be learned by actual handling of the goods and practical experience. With the caustic boil on heavy cloth it is customary to give the goods a thorough wash and give a second boil with a light solution of soda ash of about 1 to 1½ per cent. to the weight of cloth in the kier, and boil for another 6 hours at 20 pounds pressure. The enquirer should find his position very interesting and should accumulate valuable data in connection with the process of bleaching.

Cold Pressing and Hot Pressing Hosiery

Would you kindly give us a little information regarding cold pressing and hot pressing in mercerized and cotton hosiery? Is there any great difference in the finish and are there any advantages or disadvantages in using one or the other? (3928)

Mercerized hose is usually given a strong pressure without heat, while cotton or plain lisle hose is given a pressure with heat. The mercerized hose is supposed to have a luster imparted to the yarn and, therefore, the stocking needs only straightening out and to be firm so as to lie straight. On the other hand, the cotton hose needs a luster and the combination of the pressure and the steam brings this out. Steaming also gives the hose a softer feel. The kind of yarn and the general shape of hose will tell the kind of finish needed.

Streaks in Dyed Jersey Cloth

We have been having considerable trouble in the dyeing of our jersey cloth during the last few weeks. This same identical line has been manufactured by us for over a year and the greater part of this time we have been free from any trouble and our shades have come through very well. Lately, however, practically every piece has been streaky and blotchy. We have, we believe, a very capable dyer, who is at the present time dyeing quite successfully heavy velour cloakings,

which ordinarily are much more difficult to bring true than jersey cloth.

We have sent you under separate cover a sample yard of a dyed piece showing the fault, and a sample yard of the cloth in the white, showing it just as it is before dyeing. We give you the following particulars as to stock, oil, dyeing, etc., showing our present method of handling:

Stock—Australian broken tops.
Oil—No. 1 winter killed lard oil.
Fulling—Palm type soap.
Scouring—Combination soap, soda ash, and tetraline.
Dyeing—Boil out with soda for one hour, enter cold, add bath, bring to boil from 40 to 50 minutes and boil for 45 minutes, tap, cool off and extract.
The particular piece of navy sent to you is dyed with
3½ % Kiton Blue 10-B
1⅛% Acid Black M
20% Glauber Salt
2% Sulphuric Acid

We trust that you will be able to make an early analysis of these cloths for us and ask you to wire us your result as soon as possible, as we have for the present discontinued the dyeing of this cloth and there is a large quantity being made from day to day. (3933)

We wired the enquirer as follows: Eliminate soda bath; substitute 3 per cent. ammonia at 110 degrees; run 20 minutes, cool, add Glauber salt and dyestuff; run 10 minutes cold, add 3 to 4 per cent. sulphuric, run cold 30 minutes. Take 1 hour to bring to boil. Do not allow white goods to remain in washer or kettle over night.

This wire was followed by the following information given in a letter: After a careful examination of the white sample we are forced to the conclusion that it has been left over night in a washing machine where there may possibly have been leaking valves, rusty water pipes, or perhaps a hot-water leak. Rust stains indicate this strongly. Such stains seldom take the same color as the piece, even in a navy. The rust may have been picked up from a truck with unprotected iron inside, or may have come from an overhead drip.

If the goods were brought up to a good lather and this not killed by too much tetraline in the washer, they would feel less gummy and have no odor. The worst thing that could be done to the pieces is to give them a soda bath in the dye kettle and boil for 1 hour. Probably there is nothing that will more surely produce cloudy goods. Soda and acid dyeing

do not agree. Many of the dyer's troubles are caused by finishers leaving an excess of soda in the goods.

A 3 per cent. ammonia bath for 20 minutes at 110 degrees is most efficacious for removing impurities left from soap and soda solutions in the scouring.

It is important that the jersey cloths run cold after the Glauber salt and dyestuffs have been added for at least 10 minutes, and no less than 3 per cent. up to 4 per cent. of sulphuric acid added and run 30 minutes cold. It is fatal also to bring them to a boil in less than one hour.

Tinting Mercerized Yarns

I would like to know how combed peeler skein yarns are given a brown tint, similar to the shade of Egyptian yarns. At what stage of the mercerizing is the process of tinting applied? (3934)

The tinting of cotton yarns is effected after mercerizing. It may be done before passing the yarn through the caustic bath, but there are some uncertainties that affect the result. The best practice is to tint after mercerizing. If it is attempted to tint the yarn before mercerizing, the dyer must select those dyes that are found to resist the action of caustic soda of the strength commonly used for the purpose, and also to resist the neutralizing action of the acids used. There are not many dyes that will serve for this purpose. On the other hand, there is an important element of economy in tinting afterwards, due to the fact that the wet yarn coming from the neutralizing and washing baths is ready to go at once through the tinting bath, while if the yarn was tinted first, it would have to be dried before it could be passed through the soda solution. For tinting after mercerizing, the dyer has a wide choice of dyes to select from in order to make his shade.

Napper Belts

We have a Tomlinson napper made in Rochdale, England. We have considerable trouble with the belts running to the inside and climbing over the flanges. The wire soon chews the edges off, spoiling the belts. Please advise the cause of this and any remedy for same and oblige. (3931)

The trouble may be due to crooked splicing of the belts, or perhaps an excessive amount of dressing has been used on the

belts neutralizing the crown on the pulleys. Either of these causes will result in this trouble, as will uneven tension on the bearings. Having too much tension on the cloth when passing it through the napper will give the cards too much work, this also causing the belts to act in the manner described.

The remedy is to overhaul the machine, clean off the pulleys if there is any paste or resin adhering to the surface, and take great care to piece the belt straight. Pay attention to the bearings on both sides to see that one side is not tighter than the other. If there is no crown on the pulleys we would suggest making a crown with a leather belt the full width of the pulleys inside the flanges, trimming the sides to a paper edge. If one pulley is crowned in this way all will have to be done, of course, otherwise the speed of the cards will be changed.

Wax Stains on Organdie

Enclosed is a small swatch of organdie starched with 20 pounds of thin-boiling corn starch and 30 pounds of paraffin wax to 120 gallon mixing. If the starch and wax are not kept boiling in the mangle box the wax becomes cool and separates and adheres to the cloth in places, causing stains. If a steam jet is kept constantly blowing into the box it reduces the strength of the starch. A coil of pipe does not seem to keep it hot enough. Can you or any of your subscribers tell me how to keep the wax in solution, without injuring the color or fabric? (3927)

It appears to me that the enquirer has too large a quantity of wax in the mixing for the quantity of starch used. The surplus of wax cannot be held in solution in the mixing and is the cause of the stains complained of. The writer has had the same trouble and overcame it in one instance by reducing the quantity of wax in the mixing. In another instance the fault was remedied by putting a coil of brass or copper pipe in the bottom of the starch box and not overloading the starch box with more sizing than the coil would heat to boiling temperature. The coil must be equipped with an exhaust valve to let the condensate escape so that the coil will do its work. With an adequate pipe coil and the steam kept on at the inlet at full pressure and the valve at the exhaust open just enough to take care of the condensation, the starch in the box can be kept boiling all the time. This is a great improvement over blowing live steam in the box. The latter practice not only dilutes the mixing too much, thus wasting starch, but it also causes uneven finish on the goods.

In regard to altering the mixing, we are of the opinion that the enquirer could cut the quantity of paraffin wax in half without having much effect on the finish. While the wax gives the goods a little more sheen, we believe that if a little more starch were used and less wax the effect would be a more springy finish to the goods and the spots from the wax would be done away with.

With the coil in the box, we would also advise the use of a thermometer to aid in keeping the sizing solution at one temperature. Put the starch in in small quantities so as not to cool it off too much when putting in new starch, as the change in temperature will cause this trouble.

Crumbling of Cement Vats

We are having trouble with the cement coming loose in the sour and soap vats in our bleachery. Is there anything that we could mix with the cement to keep it from crumbling and falling off? We are obliged to dash our vat walls about every nine months or they will leak. Our vats are all made of cement. (3943)

We do not know of any preparation as yet on the market which will make new cement bond to old. The best way to repair the vats would be to put in an inner lining. This could be 3 inches or 4 inches thick with wire reinforcing. Where acid is used in vats they will become rough after a while and will require recoating. When the lining is put in a finish should be put on while the concrete is green. The mixture should be 1-2-3. Trap rock should be used that will pass through a 1-inch mesh. If the correspondent has vats with wood casings these should have dove-tail laths put on every 3 inches and then 1-inch chicken wire used for reinforcing.

White Tip on Imitation Fur Fabric

We are enclosing a sample of a piece of imitation fur fabric manufactured in the East. How is this white tip obtained, and does it require special operations? Is it a patented process?

The tipping of pile fabrics, such as this sample and others of a similar nature, including those that are woven with a tussah silk pile and a cotton back, is done in two general ways. In one case the woven fabric, after dyeing and drying, is prepared for tipping by being crimped in the manner usual

for such fabrics, and then the cloth is laid out on a large table, pile up. The workmen, with wooden blocks covered with felt, apply to the tip of the pile in irregular fashion a discharge composition that destroys, by bleaching out, the dye wherever it comes in contact with it. For large output, the work of tipping may be done on a tipping machine, operated much like a shear or brush, but not revolving so rapidly.

The composition applied may be made up in several ways. Formerly this white tip was made with tin crystals thickened with starch or dextrine, but in later years it has been made with bisulphite of soda, or preferably with a thick paste of hydrosulphite of soda, which can be purchased on the market at this time. The thickening is done by means of starch or white (soluble) dextrine. Some "tippers" also employ a small quantity of pipe clay in the paste so as to cause it to show on the goods after being applied. It has no chemical action.

After supplying the tip the cloth is put in a steamer and subjected to a pressure of ½ to 1 pound of steam for ½ to ¾ of an hour. This causes the chemical reaction to develop, when the dye where the tip was applied is destroyed. When the steaming is finished, the cloth is removed and washed to free it from excess of chemicals and starch, and then dried and finished according to the nature of the goods.

The process is not patented. In the early days of carriage robe manufacture in this country, there were but two or three men who knew how to do this work, and in consequence they carefully guarded the secret. In course of time, after others began to experiment along the same line, a knowledge of the process became generally common among plush workers.

Equipment for Wool Yarn Mill

Will you kindly give us a detailed list of machinery and apparatus necessary for a fully equipped plant for the manufacture of wool and merino yarns, also core yarns, for the knitting trade? We would like the list to include everything you can think of as necessary for efficient operation, down to the press for baling the yarns. (3939)

In order to give a reply of specific value on the machinery and other equipment necessary for a yarn mill the production wanted or the number of sets, should have been stated. However, assuming that a 10-set mill is desired, the equipment would be about as follows:

1 stock dyeing machine, 2,000 pounds capacity.
1 skein dyeing machine.
1 skein dryer.
1 hydro-extractor.
1 stock dryer.
1 burr picker, 40-inch.
1 Fearnought mixing picker, 40-inch, equipped with self-feed and Spencer automatic wool oiler.
3 Gordon-Hay waste cleaning machines.
1 garnet machine, 2 cylinders.
10 sets of cards equipped with metallic breasts, undergrids, waste-end conveyors, Chapman electric neutralizers, grinder frame, etc.
10 mules, 360 spindles, 2½-inch gauge, heavy spindles, equipped with tension band regulators.
2 winders, equipped with skein winding attachments.
5 twisters for double twist and core yarn.
6 skein reelers, 72-inch.
1 bobbin winder, 60 spindles.
1 baling press, 400 pounds capacity.
The above estimate can be modified according to the size of the plant desired.

Full, Bulky Worsted Yarn

We want to produce an exceptionally full, bulky, lofty worsted yarn, two-fold. What twists do you recommend? (3949)

Perhaps the enquirer wants what is known as a "balloon yarn," which is not to be produced in its perfection by the ordinary means of slack twisting. A method of making this has been described by a spinner who devoted a great length of time to experimentation and who has often been called in to advise in cases of difficulties. He found an English spinner struggling to make a yarn as described and getting only poor, lean results. The man had used five turns in the single and the advice given was "use four." He had given three twists to the two-fold and with reluctance and under persuasion gave nine. He then scoured the sample and in obedience to instruction took five of the nine turns out. The outcome was a rich thread absolutely with fullness. At any rate you might try the experiment adjusting the twists to your own special needs.

Construction of Wool Goods

I would like to have a description of the kind of materials used and the construction of cloths such as samples enclosed, as they are made at the present time. These cloths are used in men's wear, 54 inches wide, and are made in staple shades such as black, dark blue, dark brown, dark green, gray mixtures and oxfords. (3938)

The samples of cloth belong to the melton class which are usually manufactured along with ordinary fancy or plain wool goods. The constructive idea is a fabric set loose enough to weave well on a weaving plan that will aid in preventing any design being created by the weave. The loom width is great enough to allow considerable fulling in the filling direction. The idea of finish is a solid, firm, leathery and smooth handling fabric with equal nap on each side and enough to completely hide the form of weave.

The cost should be calculated the same as for an equal weight of fancy wool fabric because the difference in cost between the two is not enough to warrant a distinction. It must not be forgotten that the leathery handle is an essential feature and to create it most efficiently the fabric must be shrunk enough in length. In the case of solid colors dyeing should be done on the woven fabric to best cover up particles of foreign matter and in mixture shades a pulled wool should be used for the white and other predominant shades to obviate speckiness in the cloth.

A pure shade is required for the white and care should be taken not to have it too coarse, otherwise the cloth will appear too hairy.

Nibs in Combed Sliver

I am sending you by mail samples of scoured wool, carded sliver and finished top. This is Australian wool. I am having trouble with little hard nibs that I cannot seem to get out at the comb, or find out where they are made. (3959)

There are some nibs in the scoured wool samples; also in the carded sliver, but it doesn't look as if the cards are making any more. The combed sliver looks first-class work for single combing, but of course more of the nibs could be taken out by recombing. Apparently a few nibs are being made on finishing gill boxes after combing, from split pins or some other cause.

A wool comber to whom the sample was submitted replies as follows: The wool is rather harsh and brittle for wool of this nature, due to a harsh alkali treatment in the scouring process. The fibers will break in the carding process easily, and roll into hard nibs. It is a very hard proposition to take them all out on the comb no matter how fine the circles are. There is also a quantity of overgrown and short bottom wool in the stock, which doesn't help the case any. An overgrown wool breaks in the combing process and, therefore, increases the nibs in the carded sliver. Oftentimes close setting of the cards will break a lot of fibers, causing the same trouble. There is also another cause of numerous nibs being made that is, by the fancy on the card not being properly set.

The carded sliver submitted seems to be quite clear, but I notice that there are many broken fibers which are curled up into soft nibs. When this sliver is gilled it makes matters worse, as the longer fibers are straightened out and the short curled-up nibs remain on top of the sliver and are harder than the carded sliver. Care should be taken in gilling in such a case in order to gill the wool with the shortest possible draft. If the draft is long, all the short curled-up fibers will rush through the fallers without having a chance to get straightened out.

If the sliver receives the proper percentage of oil it will facilitate the combing to a great extent. Also the setting of the comb should be looked into to see that the circles are turning true, that the pinning is right in large and small circles and that none of the wool is riding over the tops of the pins. Also see that there isn't any noil riding around the small circles.

It is a difficult matter for anyone to produce a first-class top. It can only be done with care all the way through. In the first place, when sorting, take out all possible short clip and overgrown wool; use just enough alkali to cut the grease but no more; this will give a soft, lofty wool to work on. Don't have it too dry; about 25 per cent. of moisture in wool makes better carding and less waste. Set the first cylinder workers on the card to about 28 gauge; strippers, 26 gauge; doffer, 28 gauge; second cylinder workers, 30 gauge; strippers, 28 gauge; doffer, 30 gauge. Don't run doffers too fast, as it will break up the sliver so that it will have a very bad effect in the gilling. Gill with 4 to 4½ draft on your preparing gill boxes, or with shorter draft if necessary. Make your sliver about 6½ ounces to 5 yards for your combs, and

put in about 2 to 3 per cent. of olive oil. Set the comb properly; use 44 per inch in the large circle and 46 per inch in small, if you have them; or 42 in large and 44 in small is fairly good if the carding is good. See that the circles are running true, and have the small circle a little higher than the large one. In finishing a top of this nature never overdraft the stock; always run it on the safe side.

Cocoanut Oil in Sizing

Is cocoanut oil ever used as a softener in sizing cotton warps? (3950)

Percy Bean has the following to say on this subject in his book "The Chemistry and Practice of Sizing":

Cocoanut oil is occasionally used as a softener in sizing. It is a white fat, having the consistency of lard or butter and the characteristic smell of cocoanut. The melting point is low and varies considerably ranging from 68 degrees to 82 degrees F.

Cocoanut oil combines with alkalies, producing soaps. These soaps are sometimes known as marine soaps due to the fact that they can be used with salt water. Unlike the solutions of soaps from other fats and oils cocoanut oil soap is not readily precipitated by means of salt solution. Cocoanut oil soap may contain a very much larger percentage of water than other soaps and yet remain hard. Cocoanut oil is largely used in sizing in conjunction with Epsom salts. It has the property of mixing more readily with this substance than any other oil or fat.

Mark to Stand Bleaching

We are in the market for a crayon that can be used to mark unbleached cotton knit goods and will not be effaced in the bleaching process. Our bleacher puts the webbing through a lime bleach and then an acid bath, and we have been unable to find anything that will stand this process. We would appreciate very much if you could put us in touch with someone who might be able to furnish us with such a crayon. (3958)

We do not know of any crayon that will resist the bleaching process. Coal tar is commonly used to mark goods, being applied with stamps. This is put on a felt pad and a layer

of cloth put on the pad so that the stamp will not carry a surplus of tar and smear the goods. If the coal tar is too thick, which will occur in cold weather, it can be diluted with commercial carbolic acid, stirring it well in the tar to make the mixture flow better.

Care must be exercised not to let the stamps get covered with lint from the goods, otherwise the stamp will carry too much tar and smear the marks, making them unintelligible. If this is handled right you can make a success of it. If it is necessary to change the marks or numbers frequently, have a set of letters and numbers on blocks. These can be made of uniform size with a clamp for the blocks to fit in and a thumb screw to hold them in place.

With experience and a little care in mixing coal tar one can procure satisfactory marks on goods. It is necessary to be careful not to use too much carbolic acid, or the marks will bleach out like the crayons.

Test for Shrinkage

Can you give me a description of a suitable test for determining the shrinkage of woolen fabrics? We buy large quantities of cloth and wish to compare the shrinking qualities of different deliveries. (3965)

Little work has been done on shrinkage tests and the only method we are familiar with is the one employed in the testing of military cloths purchased in the United States by foreign governments early in the war. This test was conducted as follows:

The sample is first placed in a conditioning room in which the humidity is kept constant at about 65 degrees (relative humidity) and the temperature at about 70 degrees F. For accurate comparative results this is necessary, because under different atmospheric conditions woolen cloth shrinks or expands slightly, and it is, therefore, important to make the measurements before and after the shrinkage operation under the same atmospheric conditions. If a conditioning room is not available, the humidity should be noted and the sample remeasured after shrinkage at a time when the humidity and temperature are about the same as when it was first measured.

After leaving in the conditioning room for at least an hour, the sample is cut to the determined size. This should be as large as convenient, for the larger the sample the greater the

accuracy. One foreign government, for instance, specifies that pieces 28 inches long (warp direction) and 52½ inches wide (filling direction) should be used for their test. It is better, however, to use a piece which is square. A square yard is a convenient size. The cloth should be spread out evenly on a large flat table and the cutting lines marked out with a T-square, care being taken to get the lines as parallel as possible with the warp and filling threads and at the same time perpendicular to each other. The measurements must be made as accurately as possible.

After cutting out the sample it is placed in a tub or kettle of water which is kept at a temperature of 21 degrees C. or approximately room temperature. In placing the sample in the water care must be taken to see that both surfaces are thoroughly wet and that no air bubbles are caught and held by the cloth. This is necessary to give all the fibers a chance to absorb the moisture uniformly. The sample is left in the water for 4 hours and then taken out and placed in a drying oven. This oven should not be too hot. A temperature of about 70 degrees C. is best. When dry it is removed and again placed in the conditioning room. The sample must be thoroughly dried out and not removed from the oven when still damp, as it is much quicker and easier to subsequently bring the cloth up from dryness to the standard moisture content than down from wetness to this standard condition.

The sample should be left at least 2 hours before attempting to remeasure it, and preferably longer if convenient. It is placed upon the table smoothed out and remeasured carefully by taking several measurements at equal intervals across the piece. This is necessary, as it often happens that the shrinkage is slightly uneven, and only by taking several measurements and using the average of these is an average value obtained. The measurements are made in both warp and filling directions, and the shrinkage calculated and reported as shrinkage in the warp direction, shrinkage in the filling direction and shrinkage in area.

It often happens that the shrinkage will be great in the warp direction and zero in the filling direction. In fact in some cases there is a slight elongation in the filling direction. This is partly due to the fact that there are usually more threads in the warp than in the filling, and in some cases the warp threads are given a high twist and the filling threads very little twist. Thus, when a fabric comes in contact with the water the warp threads shrink so much more, proportion-

ately, than the filling threads that the whole sample is forced out in the filling direction.

The test described is more severe than an ordinary wetting, but not as severe as a washing in hot soap and water would be. It was devised to form a basis of comparison for different samples, and as such gives very good results.

Use of Cement Vats

To what extent are cement vats used in dyeing, bleaching and finishing plants processing textile materials? What are the various purposes for which these cement vats are used? (3962)

Cement vats and tanks are used in the bleaching of cotton in the form of raw stock, warps or piece goods, for the alkali and neutral processes only. They are used for the mixing and storage tanks after goods have been treated with chemic and are allowed to lie for a certain period of time for the whitening process.

In some large bleacheries, the cement bins are also used for the storage of bleached goods in neutral form before mangling and drying. The writer has also worked in plants where cylindrical cement vats were used for boiling kiers, but these cannot be recommended as being very successful, because of the fact that in a comparatively short time the expansion and contraction caused by the boiling and cooling off is very liable to cause cracks in the cement.

For the processes mentioned, however, both of which are cold, the cement vat is very satisfactory and there are a great many being used throughout the country. There is really no process in the actual dyeing and finishing that cement vats may be applied to, excepting probably the boiling of starch, but it is customery to use metal jacketed kettles for this purpose.

Weight Added in Waxing Cotton Yarns

We are desirous of obtaining some information about the waxing or glazing of cotton yarns. Take for instance a 26/2 combed or carded yarn. After the yarn has been bleached, what is the average percentage of weight that it takes on during the waxing or glazing process? (3963)

In the waxing of cotton yarns, size 26/2 will take on about 3 per cent. of weight. It should be stated, however, that in

the waxing of cotton yarns it is not the weight added that is important, but the thorough laying of the fiber and the smoothness of the thread after the process. Glazed yarns should take on from 5 to 6 per cent., according to the size of the yarn glazed.

Proportion of Two-Beam Weaving

The question has been put up to me as to what proportion of fancy goods weaving is two-beam work. This would include terry toweling but it would not include silk plushes, etc. I don't suppose there are any statistics, and any figures that can be given will be merely a guess, but your guess would be an intelligent one, and I would like to have it. (3961)

The enquirer is right in assuming that there are no statistics giving the proportion of two-beam work in fancy weaving Estimates we have secured place the proportion of two-beam work all the way from 15 per cent. to 50 per cent. of all fancy goods woven to-day. Probably a safe figure is 30 per cent.

Machinery for Felt Manufacture

I am enclosing herewith a sample of felt which we have been asked to make. A contract to the extent of 200 yards of this felt, 62 inches wide, per day, has been offered to us. Can you have this felt analyzed as to its makeup and give us the schedule of machinery for the manufacture thereof, beginning with the carding.

This material looks to us as though it might be made on a crossform after the cards, without being spun or woven before the fulling. What do you say about this? What, in your opinion, are the various uses for which this class of goods would be employed? (3947)

The sample of felt submitted is a pressed felt made on a crosser former from wool and cotton, mixed in the proportion of wool, 52 per cent.; cotton, 48 per cent. Pressed felts are made on crosser or straight formers by continuously laying down the web from the doffer onto an endless apron. The product of the crosser former, having the direction of its fibers alternating, is stronger.

In manufacturing felt of this kind you would need the following machinery:

Breaker cards, two 60 x 60, or four 48 x 48.

Finisher cards (attached to crosser former), two 90 x 60.
Crosser former, 100-inch apron.
Platen hardener, 36-inch apron.
Pusher fulling mills, two 36-inch, 2-hammer.
Washer, 4-string.
Extractor, 42-inch hydro-centrifugal.
Dryer, horizontal.
Finishing machinery.

It would not pay to make this installation for a contract of this size as it would cost at least $50,000 for the machinery alone as listed above. You could, however, from this layout, get a production of twice the amount of the contract.

Dyed Cotton Cloth Changes Color at Selvages

Enclosed please find a sample of cotton cloth dyed with sulphur blue. As will be noticed, the selvage has reddened and we are at a loss to fully explain or remedy this. This redness seems to show up when the cloth is in the air very long, but the center of the piece of cloth will stay the required shade no matter how long it is aired. With several direct cotton colors we have had the same fault. Any explanation or help will be appreciated. (3967)

A dyer replies to this question as follows: It appears to me that these goods are jig dyed, and there is a certain amount of surplus liquor carried along the selvage that is affected by contact with the air, causing a chemical reaction. I am presuming that the goods are jig dyed. If there is any other kind of dyeing or any bleaching carried on under the same roof it is possible that fumes from this have produced the change of color. It is certainly evident that there is some action on the color to produce the change in shade.

If there is any other work being carried on under the same roof that would have any action on the dye, keep a good watch and see if it can be attributed to that. If there is nothing that could cause it, I would advise the correspondent to keep the ends of his rolls covered up tightly with a damp cloth until he gets the goods dyed and see if this does away with the trouble. If this will not stop the color from changing, he will have to turn to the dye bath and find out if he is using the bath too hot, and the sudden changing of the temperature, which will always affect the selvages first, is causing the trouble.

The reddening of the selvage is due to something that has

a direct action on the goods in the wet state, to the action of the air on the selvages, or to the change of temperature of the goods in passing through the bath and on to the roll. From the appearance of the small sample submitted I believe the trouble will be found to be due to contact with the air.

Linen Industry

What industries use flax? It is our intention to give some thought to the flax business with the idea of making a connection with manufacturers interested, and if you can furnish us with any literature along these lines it will be greatly appreciated. (3964)

Flax is used in the United States for the manufacture of linen thread and twines and also by the few American mills making such woven goods as linen crash, toweling and canvas. It is a fact, however, that we have no great linen industry in the United States. The mills here that make the finer goods generally import their own raw material although a few mills making very coarse goods, like the Klearflax Linen Rug Co., Duluth, Minn., use domestic flax.

Perhaps the best books on flax manufacturing are "The Spinning and Twisting of Long Vegetable Fibers," by Carter, and "Jute and Linen Weaving," by Woodhouse and Milne. These volumes can be secured from our book department at the New York office of TEXTILE WORLD.

Production of Worsted Machinery

How much production should I get on seven sets of worsted cards, and how many combs do I need for them? How many sets of drawing should I have to keep up with the cards and combs? Also how many spinning spindles on the Bradford system could I run with this preparatory machinery on one-half blood stock so it will spin to 40s on an average? At the present I am running 7,000 spindles, and I would like to get a little better production in the card room if possible without running overtime. (3973)

If your cards are 48 inches wide, with cylinders running at 100 revolutions per minute, clothed with say, first cylinder 110x10 and second with 125x12, and other rollers in proportion, you should turn off about 35 pounds per hour per card on the average, reckoning about 3 hours per week for stripping and grinding. Owing to the construction of the card, if

any attempt is made to increase the load or accelerate the speed, the result is bad work, either a neppy sliver or broken fibers, both of which are fatal to good work in the subsequent processes.

With the same quality, Noble combs with 4-foot circles, pinned 33 per inch, and small circles 37 per inch (inner rows) making 3¼ revolutions per minute, using 7-ounce slivers from punch box, with an average tear of 6 to 1, should turn out 29 pounds per hour of top. Thus, 29 pounds of top, 5 pounds of noil, 1 pound of waste, etc., and allowing for stripping, grinding, etc., runs about 7 cards for 6 combs.

As a set of drawing should get through 2,000 pounds per week of 48 hours, and 7 cards turn out 11,760 pounds less noils, waste, etc., leaving 10,000 pounds net, 5 sets of drawing will be required. You do not state whether cap or fly frames are used, but as from 12 to 16 ounces per spindle can be turned out from the above figures, it will be easy to calculate what your production ought to be. If it is increased production you are seeking it means increasing the number of your cards, for as previously stated there is great danger either in increasing speed, which tends to an abnormal amount of fly, or heavier loading, which means broken fibers and bad work. If the cards overrun the combs, the speed of circles or the weight of slivers may be slightly increased, but still there will be a risk of cut slivers which will turn to slubs in the drawing. But there can be an increase of production in drawing and spinning by increasing drafts.

The question is often asked, "Why does cotton with a shorter staple stand a draft of 10 to 1, while wool of a longer staple plucks and makes uneven thread if the draft is over 7 to 1?" If the distance between back rollers in a spinning frame, with only light wooden carriers acting as retarders, is taken into consideration the answer is found. Take out your wooden carriers and replace them with iron ones, and you will find that you can considerably increase your draft, and still turn out an even thread. Thus you can increase your output without extra machinery, and will also be able to dispense with one or more processes in drawing. It is the evenness of the feed as much as the speed of front rolls that has to do with the making of an even thread, and it is found that iron carriers just retard enough without holding fibers too tight.

It is more than time that mills gave up being hidebound as to the various details in machinery as supplied by the makers. This applies also to the back roller drive in combing and

drawing boxes. As a rule the boxes are turned out with half-inch pitch gearing. Sometimes with very fine classes of stock the difference of a tooth in the draft gear gives either a too tight or a too slack delivery to the fallers. If quarter-inch pitch gearing is used the altering of a tooth only makes half the difference, and gives exact delivery required, because the various gears in the train must fill up the space between back shaft and back roller, therefore, require to have double the number of teeth, to accomplish this. And it will be found that quarter-inch gearing is plenty strong enough; for if this gear will drive a spinning frame with from 70 to 100 spindles a side, there can be no doubt of its driving the back rollers of a gill box without danger of a breakage. BRADMORE.

Relations of Fiber Length, Yarn Twist, Strength and Elasticity

In the course of developing a new line of yarns we have felt the need of some theories on which to base our manufacture, and write to ask if you can either direct us to such publications as may deal with the question or deduce the various relationships for us. We are particularly interested to know what relations exist between tensile strength and elasticity of a yarn; the length of its fibers, and the twist of the single and ply yarn. (3954)

There is one publication which we know of, and have seen, that deals in the relationship between strength and elasticity of yarns. It is the "Bulletin de la Société Industrielle de Mulhouse," April, 1907, by M. Charles Gegauff. This publication was illustrated with curves of the strength and elasticity, plotted against the twist multiplier for various yarn numbers.

Very briefly, the strength increased up to a certain multiplier such as about 4 to 4½ for 23s yarn, and then remained the same for a short way, and dropped abruptly. The elasticity increased throughout the experiments.

In the treatment of elasticity in this publication, the author differentiates between elasticity and stretch. He refers to elasticity as the stretch which is recoverable, whereas the usual textile conception of elasticity refers to total stretch. If the enquirer has the proper conception of elasticity he will understand that it is very difficult to obtain an elasticity greater than the elasticity of the individual fibers. There are

two ways of increasing elasticity of individual fibers. One is by twisting them so that their angle with the axis of the yarn is increased, and the other is possibly by chemical treatment. On the other hand, if the enquirer wishes to change the stretch of the yarn, it may be governed by the twist, and the more twist that is put in up to the limit of that which the fibers will allow, the stretch will be correspondingly increased.

For the same twist of single yarn, the elasticity may be increased by twisting the ply in the same direction as the singles. The strength will be reduced. If the ply is twisted in the opposite direction, the strength is increased, and the stretch is decreased. It is possible to modify this by starting with different twists into singles yarn.

Regarding the relation between the length of fibers and the strength, it must be considered that the length and the surface characteristics of the fibers are the determining factors. For instance, if a 1⅛-inch cotton has a satisfactory surface, it will make a yarn practically as strong as a 1¼-inch cotton, which has practically no surface characteristics over ⅛-inch at the tip. Assuming the same surface characteristics, the longer cottons will produce the stronger yarn, and because they do not require as much twist, the stretch is less, but the elasticity may be greater.

The enquirer will find an illustrated article in the August 14, 1920, issue of TEXTILE WORLD on the relationship of twist, strength, and elasticity in cotton yarns. This article was based on a study carried out at the Lowell Textile School.

Burning Out of Fuses with 1 H.P. Motors on Looms

Would you kindly give me some explanation about the following: I have considerable trouble on 1 horsepower motors connected to Knowles box looms. It often happens that the fuses burn out while the loom is in motion. Sometimes after the motor is stopped in the evening the fuses are blown out in the morning. I can see nothing wrong on the loom; the break and everything works in the proper way. (3966)

With the information on hand it is difficult to give any particular cause for the trouble referred to, and in reply we can only state some of the principal causes for such trouble.

First, the ampere capacity of the fuses should be checked to see if they are the right value for use with the motors.

Second, the voltage and frequency of the electric circuit should be checked to see if the supply is correct for the name-plate rating of the motors.

Third, we recommend that an electrician test the motor and switch and wiring from the switch to the motor, to see if any ground connection exists, which would be a cause for frequent high potential at the switch contacts and cause an arcing over or short circuit, which, of course, would cause the fuses to be blown.

Fourth, the load required to be developed by the motor should be checked to see if any overload exists. It is possible that a loom requires some fixing to overcome jamming or trapping of the shuttle in changing the boxes, providing, of course, that the particular loom in question is a box loom.

Reducing Noise in Weave Room

Can you give any suggestions to reduce the noise of a weave room to a minimum? We have moved into our new addition, and while we operate only 50 looms, the room is a great deal noisier than our former one; in fact, the racket is terrific, probably on account of vibrations and the type of ceiling. I have heard that the noise can be reduced by a series of wires strung through the building and by other means. I would be very glad to get suggestions along this line. (3953)

We have never heard of stringing wires through a building in order to reduce the noise. The only suggestion we can make is to place a noise insulating cushion between the loom and the floor. The H. W. Johns-Manville Co. and the Armstrong Cork Co., both of whom have offices in all the large cities, have noise insulating cushions for machinery, and it would be well to get in touch with these firms. We do not believe the suggestion of wiring arrangement would help any.

Denim Construction and Equipment

Can you give me a few denim constructions? How many automatic looms will weave the product of 5,000 spindles? Can I afford to run a dye plant on one color, for a mill as small as this? Please understand that I do not want the information to build the mill by, but to figure and plan by. I would like to have it as near right as possible without too much investigation; but am not particular about its being exact. (3968)

Common denim constructions are as follows:

2.20 yards per pound, approximately 7¼-ounce goods; 68x44, 27 inches; 8s warp, 10½s filling. Carded stock, warp dyed blue or brown.

2.40 yards per pound, approximately 6¼-ounce goods, 68x44, 27 inches; 8s warp, 14s filling.

3.20 yards per pound, approximately 5-ounce goods; 60x40, 27 inches; 10s warp, 15s filling.

It is unusual for the sley on these goods to exceed 68, or the pick to exceed 44, or for the warp to exceed 10s. The filling governs the yards per pound or ounces per yard. There are grades between the ones mentioned above. The first two are very good denims, the third is a medium. A light or low grade denim would be 4 yards per pound, or 4 ounces per yard.

Approximately, 150 automatic looms would be required to weave the yarn production of 5,000 spindles, although this number might be increased or decreased by the construction of the goods. It would be practicable to run a dye plant on one color for a 5,000-spindle denim mill.

Duties of Boss Spinner

I would thank you if you will give me a full explanation concerning the duties of an overseer of ring spinning.
(3976)

The entire responsibility for the ring spinning department rests upon its overseer, and he should, accordingly, understand, supervise and be cognizant of every activity occurring within it.

The details of the overseer's work are so many and so varied that it would be next to impossible to list them without incurring the liability of making some omissions.

As a general rule he is held entirely responsible for the personnel of his department. He is usually expected to hire his own help. Consequently he should aim to have a full working force as much of the time as possible, yet to employ the minimum number of hands necessary to turn out a full production of good quality yarn. He should use his best judgment in selecting and placing employes, eliminating, when possible, those who are unfit, and doing all in his power to encourage and advance those who are ambitious, intelligent and worthy. He should see that each operative understands

his or her duties, and performs them effectively and thoroughly, with the least possible waste of time and materials.

He should strive at all times to obtain the largest possible production consistent with good quality. Technically speaking, he should know what speeds and twists are appropriate for the yarns he makes and the equipment at his disposal. He should see that such speeds and twists are employed and maintained. He should have the machinery well cared for, with careful attention to cleaning, oiling and repairing.

He should see that the waste is kept as low as possible and that good care is taken of the clean waste. So far as it is within his power he should see that his operatives have the necessary supplies to perform their work properly, yet should try to make no more requisitions for supplies than are positively necessary. In order to keep his room properly balanced, with the desirable number of frames on each kind of yarn, he should keep himself well informed as to the requirements of subsequent departments. Similarly, in order to assure himself a sufficient supply of roving he should make his wants known to the card-room overseer.

Few textile mills employ time-clocks, so it usually devolves upon the overseer to keep a record of the hours worked by each operative who is employed by the day or hour, and the units produced by any who are paid on a piecework basis.

There are usually various reports regarding production, yarn sizings and strength tests, waste produced, speeds, twists, etc., which it becomes the overseer's duty to provide at stated intervals. In larger mills the overseer frequently is allowed to employ a clerk for the purpose of making out such reports as those mentioned, and for the timekeeping and such payroll work as is not performed in the office.

Most overseers find it desirable to take daily sizings and strength tests of their yarns, whether or not they are required to do so.

To mention in greater detail the technical matters with which the overseer is expected to keep in close touch, he should see that the roll-covering is being properly done, that no damaged rolls are in use, that rolls which are in good condition are not sent to be repaired, that spindles are properly set, that ring rails and drawing rolls are level; that thread guides are properly set; that suitable travelers as to weight, size, and quality are in use and that they are not wasted, that worn rings are eliminated, that the builder motions are so set as to put the maximum amount of yarn upon the bobbin, that

frames are not doffed until the bobbins are full, that frames are not stopped unnecessarily, that roving or yarn is not mixed and that yarn is properly marked, that the rolls are properly set, that the proper change gears are in service, and that the frames are properly banded.

It is possible to increase the above list, but we believe it to be sufficient for the enquirer's purposes.

It should be borne in mind that it is not humanly possible for any overseer to inspect and observe personally all of these details. It becomes necessary to delegate many of them to the second-hand and third-hands, or other subordinates. The overseer is, however, personally responsible for the work done, and should thoroughly understand all such details and should so select and instruct his assistants that he may feel reasonably assured that the work is being carried out according to his desire.

Stamping Hosiery

We would like to have you inform us how we can stamp cotton or silk hosiery so that the stamping will not wear or wash off. (3983)

We recall a compounded coloring matter that might answer the purpose. Certain pigment colors are ground in castor oil, and this oil mixture is soluble or else can be mixed with a pyroxylin or nitrocellulose solution. The pyroxylin solution being a waterproofing compound, and also drying very quickly, would, when mixed with the ground color, make a stamp mark on a piece of goods that would be repellant to water or ordinary washing. The colors ground in castor oil come in almost all shades so the enquirer could get varied tones.

Division of Costs on Cotton Yarns

Here is a question which puzzles us and to which we find no answer in our reading of trade and technical papers. Possibly you can help us to secure information in regard to the factors which affect the price of cotton yarns. What percentage of the price of cotton yarn is represented by the price of raw material, what percentage by wages, amount of production and other factors? (3975)

The percentages of cotton yarn costs which are represented in cost for raw material, cost for labor, for overhead, etc.,

are in normal times fairly constant for certain numbers of yarn. During the past few years, and up to the present time, these ratios have fluctuated widely, due to sudden and marked alterations in cotton prices, the periodic advances in wage schedules, and the constant increases in such overhead items as fuel costs, taxes, supply costs, etc.

There never has been a time, however, when any such set of ratios would hold good for all classes and numbers of yarn. For instance, we may spin 20s yarn and 40s yarn from the same cotton and in both cases remove the same amount of waste, with the result that the material costs for both yarns would be practically identical. Differences in production and labor and machinery requirements, however, would cause the labor and overhead costs for the 40s yarn to be markedly higher than for the 20s yarn. Thus the ratios applicable in one case would not be appropriate in the other.

We have, nevertheless, attempted to give some sort of reply to the enquirer by computing costs on four widely different varieties of yarn, reducing the costs to percentages representing labor costs, overhead costs, and cotton costs. These percentages are intended to cover all the items entering into the manufacture of cotton yarn except selling expense, which depends largely upon the selling price obtained. The percentages are based upon current cost figures. The results follow:

22s CARDED WARP YARN

Labor cost	21 per cent.
Overhead cost	11 per cent.
Cotton cost	68 per cent.
	100 per cent.

44s CARDED FILLING YARN

Labor cost	22 per cent.
Overhead cost	13 per cent.
Cotton cost	65 per cent.
	100 per cent.

50s COMBED WARP YARN

Labor cost	25 per cent.
Overhead cost	17 per cent.
Cotton cost	58 per cent.
	100 per cent.

100s COMBED FILLING YARN ..

Labor cost	29 per cent.
Overhead cost	22 per cent.
Cotton cost	49 per cent.
	100 per cent.

In reply to the question as to the effect of production, we would say that about 50 per cent. of the labor cost per unit, and about 90 per cent. of the overhead cost per unit, are inversely proportional to the production. Thus, in the above cases the percentage of the total cost which is increased in proportion to any decrease in production ranges from 21 per cent. to 35 per cent.

Dyeing Cotton Duck

We are about to start dyeing cotton duck and sheeting with direct colors in an ordinary jig, and as our dyer has had no previous experience with jigs we would like any information you can give us along this line, particularly how to start the dye bath and how to handle the goods, etc. (3982)

The dyeing of heavy cotton fabrics involves both chemical and mechanical difficulties. In the dyeing of heavy shades and black the greatest obstacle is the difficulty of securing perfect penetration of the cloth. If the cloth is not dyed through and through, the goods possess little value for certain purposes. The first consideration in dyeing cotton fabrics is to give the gray cloth proper preparation in order that whatever dyeing process may be adopted, the dye will have a clear bottom to work upon. The clearer and cleaner the fabric, the brighter and fuller the resulting shades will be. Very cheap fabrics may not permit of perfect preparation, consequently, thin and hungry, not to mention uneven shades may result. Where medium and good grades of goods are to be dyed even shades with good penetration, the following method is recommended:

SINGEING: If the goods are faced, singeing should never be omitted, because if any fluff appears on the surface of the fabric, it greatly influences the depth and brilliancy of the colors wanted, whatever dyestuffs may be used.

WETTING-OUT: Some classes of goods are greatly benefited by giving them a thorough wetting-out before dyeing. This applies particularly to fabrics that are not bowked. The

wetting-out liquor is made up in the following manner, the quantities being per 100 gallons of water; from ½ to 2 pounds of soda ash and 1 to 2 pounds of soluble oil are dissolved separately in a small portion of the water. When solution is complete, it is added to the main portion. The goods are given several passages through this solution in a jig or by making use of a circulating kier. The strength of this wetting-out liquor is regulated by the apparent amount of dressing on the goods, which latter also determines how much time should be given for the operation. For high grade fabrics, however, a good bowking will be found most desirable after the singeing, thereby ensuring the saponification of all grease in the pieces. For this purpose, the use of caustic soda lye or ash may be employed in the kiers, and advantageously under pressure. After this treatment, the goods are well rinsed, soured afterwards, well washed to get rid of every vestige of acid, even with the aid of a little soda if necessary, when the goods are ready for dyeing.

Should the goods contain starch dressing, such as some kinds of heavily sized twills, malting is advisable. The immersion in the malt bath may continue for several days in large cisterns filled with warm water, the fermentation of the starch being helped with about a pound of commercial malt preparation to each 100 gallons of water. This treatment is followed by a good rinsing when the fabrics are ready for dyeing.

It is becoming a common practice in some mills to malt the goods in the jig or padder. The malt solution is made up and heated to 160 degrees F., through which the cloth is run several times and afterwards allowed to lie for several hours or over night on the shell. In the morning the cloth is made ready for dyeing by giving it a couple of passages or runs through warm water.

As a rule, heavy twills and similar fabrics are mostly dyed on the jig and the more perfect the preparation, the better will the result of the dyeing be. The usual method for dyeing on the jig is with the direct colors. The deeper the shade desired, the greater the concentration of the dye bath. Standing baths are of so little interest in jig work that their use is of no importance.

According to shade, the dye bath is made up with water containing, per 100 gallons, 1 to 4 ounces of soda ash, 5 to 20 pounds of crystal Glauber's salt, and the necessary amount of dyestuff. For very heavy shades, the Glauber's salt is not

added at the start. The bath being ready, ½ of the quantity of dyestuff is added, and the piece given 1 run. The remaining half of the dyestuff is added and the cloth given 4 or more passages at the boil, during which the Glauber's salt is added. Heavy goods always require the addition of 2 to 3 quarts of soluble oil to the dye bath of about 75 gallons for a roll of from 200 to 300 pounds of cloth.

Some dyestuffs possessing good solubility are easily dyed upon thin or loosely woven goods, and do not require penetrating assistants, but heavy cotton goods, irrespective of the solubility of the dyestuff, always require soluble oil in the bath. Heavy ducks require several runs through wash water after being dyed, so as to remove the last traces of the dye that remain, and also the small amounts of salt.

Wrinkles in Finished Goods

Enclosed we are sending you a sample of material which is full of wrinkles (washer wrinkles). Please let us have your opinion as to the cause of these wrinkles, which go all the way through the piece. We are also having trouble with some other weaves, such as tricotines and plain gabardines, which come full of wrinkles after being finished. (3979)

These wrinkles probably result from the cloth running too long in the same creases during the washing operation. This is one of the greatest causes of wrinkles in worsted fabrics. A method of preventing washer wrinkles was described in the February 28, 1920, issue of TEXTILE WORLD, and copy of this article is being sent the enquirer. The trouble can be minimized by reducing the friction and drag on the goods as much as possible. Wrinkles made in the washer are likely to be rendered more noticeable and permanent by the boiling in the dyeing process if the goods are piece dyes. Crowding and overloading in the dyeing should also be avoided.

Determining Piece Work Prices

Could you tell us how to determine the prices to pay for knitting, looping, examining, pairing, boarding and pressing infants' and children's socks from sizes 4 to 9½? (3980)

Local conditions are always the most important factors in determining practical prices for labor. There is considerable difference in the production of different makes of machines

employed for the same work. The care given machines also has a great deal to do with the matter. A manufacturer has the following to say on this question:

It has been our custom to take the average daily wage for the same class of work, adding thereto from 10 to 15 per cent. and then dividing by the average production of our skilled operatives to obtain the piece price. The practice has stood the test of over 20 years' experience and has enabled us to obtain a high production which is the most valuable consideration where the quality of the work is maintained.

Wool Cloth Construction

We have a call for some cloth like sample to be finished 54 inches independent of selvage, plain weave, to contain 64 threads in warp and 60 threads in the filling; to weigh not less than 16 ounces, nor more than 16½ ounces, with tensile strength of 32 pounds to the warp and 34 pounds to the filling. Can you tell us what size this yarn should be, how to reed this, number of harness, and how wide to weave it. Also whether the 60 picks would have to be put in in the loom or whether it could be fulled in length and about how much.

(3978)

Assuming that the sample submitted represents the cloth in question, and the number of threads per inch must be as stated, we advise you to try the following layout in a short length of cloth:

Three thousand four hundred and fifty-six threads in warp, inside of selvages, laid about 81 inches wide over-all, through a number 14½ reed, 3 threads in each dent. Also weave in 52 picks per inch.

WEIGHT CALCULATIONS

Warp yarn 4½ runs, filling 5 runs.

Warp, 3,496 yards including selvages and 8 per cent. take-up in weaving	8.39 ounces
Filling, 4,212 yards and 1 per cent. take-up in weaving	8.50 ounces
Loom weight	16.89 ounces
Loss in finishing 20 per cent	3.38 ounces
	13.51 ounces
Gain by fulling in length to hold 20 per cent	2.70 ounces
Finished weight	16.21 ounces

The quality of stock is judged to be equal to fine territory wool, and with that the cloth should be of sufficient tensile strength. A certain percentage of fine wool noil might be used, but may be that is not allowable. In any event the warp yarn will require to be sized in dressing.

Backfilling Crash Toweling

Enclosed find sample of crash toweling, both in the gray and finished. We would be pleased to have you tell us of a size or filling formula that we could use in a Tommy Dodd machine to backfill these goods and obtain a finish similar to the sample we enclose. (3986)

To finish the sample of gray cloth similar to the finished sample submitted, first bleach the goods white, scutch them and mangle them, dry them up over the cylinders perfectly dry, then give them 3 nips on a 4-bowl calender without any weight on the levers. This is to prepare the goods for the back-fill mangle. Make up one of the following mixings:

No. 1 MIXING

50 lbs. corn starch.	5 lbs. cocoanut oil.
20 lbs. potato starch.	2 qts. soluble oil.
50 lbs. talc.	Blue to shade required.
20 lbs. French chalk.	Make into 110 gallons.
16 gals. china clay.	Boil 3 to 4 minutes.

No. 2 MIXING

60 lbs. corn starch.	10 lbs. cocoanut oil.
25 lbs. potato starch.	4 qts. soluble oil.
60 lbs. talc.	Blue to shade required.
30 lbs. French chalk.	Mix as in No. 1 mixing.
24 gals. china clay.	

China clay that is used in these mixings must be mixed in a separate tub with a steam pipe connection, so that it can be boiled before putting it into the starch mixing. It is mixed with about 4 or 5 pounds of china clay to each gallon of water, then agitated well with an agitator and boiled so that no lumps of dry clay will get into the starch mixing. All these ingredients should be strained through a very fine sieve, so that no small grit will get into the mixing and cause grit marks on the cloths, or even cutting right through and damaging the goods.

Yarn Calculation for Underwear

Will you kindly give us a formula for figuring the amount of woolen yarn required in making one dozen 42 shirts to weigh 12 pounds finished? In other words, we would like a formula we can use in estimating our yarn requirements.
(3985)

A formula such as requested cannot be given by anyone not conversant with the conditions at the enquirer's mill, and the quality of the garment being manufactured. There are many things which might affect manufacturing that would have a great bearing on the amount of yarn necessary to get the required finished weight.

In the first place the quality of yarn used, as well as the quality of work done in the knitting room, would bear heavily on the amount of stock used, in the way of holes or any other bad work which would have to be cut out and wasted. This is a very important factor, but one which many people do not seem to consider as seriously as they should.

During some operations there is more shrinkage than in others. Scouring and bleaching (if these operations are done in the enquirer's mill) would materially change the allowance which must be made for losses from stock to finished goods.

Is the shirt to be finished with a cut-out neck or with the neckpiece sewed in the back? This would make a difference of several ounces per dozen in the weight of goods, and would have to be considered in making out any formula for yarn estimates.

If the enquirer cares to go into the matter fully and will send a sample of yarn to show the quality, and a sample shirt to show the finish, we should be very glad to furnish any information possible in regard to the matter, but knowing nothing of these vital matters it would be impossible to make any satisfactory estimate. Figures in different mills and under different conditions will vary from 2 per cent. to 10 per cent., which is considerable variation.

Calendering Bag Goods

We were advised by a mill that you very likely could give us instructions about the calendering of gray sheetings which are used in the manufacture of salt, flour, rice and sugar bags. These sheetings consist of such cloth as 31-inch, 5-yard, and 37-inch, 4-yard. The calendering is done to give them a finish

and to close the meshes, we presume. We have just installed a 5-roll Butterworth calender, which is made up of 3 chilled, steam heated rolls and 2 combination husk and cotton rolls. If you can give us any information regarding the proper way to calendar these goods we will appreciate it very much we assure you. (3955)

The assumption of the enquirer is right; the goods are calendered to close up the meshes and prevent the material from coming through. The proper method to adopt to get the right finish on this cloth is to dampen the goods to get them moist and soft, then get the steel rolls as hot as possible in the calender and pass the cloth through with considerable pressure on the levers. The board or table on the end of the levers should carry from 200 to 300 pounds. When putting on the weight have these levers about 1 to 2 inches from the top of the framework; this will give the levers room to swing when the seams are passing through the machine.

We would not advise you to screw the levers right to the top, as this is what is known as dead set. It will give more luster on the goods perhaps, but you are punishing the cotton or husk rolls. If you have not done much work on your calender, we would advise you to run the rolls in for a couple of days before passing the cloth through. This will give the rolls a good surface and harden them. What we mean by this is to keep the machine running constantly for a couple of days. Do not put much weight on at first, but keep increasing it as the rolls get bedded in their bearing. This will make the rolls wear better and longer.

After the goods have been passed through the heated calender, if there is too much moisture in them you will have to pass them through a second time, and perhaps a third time. This will all have to be learned by experience in finding how much water to dampen the goods with on the damper. It is customary to pass the goods through the machine dry in some cases, but this will not close them up as well as if they had been moistened. We would advise you to experiment a little along these lines and note the difference in the cloth. The cloth will look different after each operation on the machine. This will be more evident if you let the goods lie on the roll in their hot state and let the cotton absorb the moisture before passing the cloth through the machine a second or a third time. To get a better idea of the work, pass a sample through dry; then slightly moisten a second sample and pass it through only once; then for a third experiment

take another sample of the same cloth, dampen it a little more, pass it through the machine and let it lie for about 2 hours, then pass it through again, and let it lie for another 2 hours. Then calender it for the last time. Open the 3 samples out on the same table and you can judge for yourself which is the best procedure.

After the machine has been running 2 or 3 months you will probably have to scrape the ends of the husk rolls to be able to get the finish at the middle. This can be done with the rolls in the machine, using an old heavy file for a tool. We have gone into elementary details in replying and hope the information will be useful in starting the enquirer right.

Unevenly Dyed Jersey Cloth

You will note in the enclosed samples of jersey cloth that the shade is listed side to center. You will note that the center of the fabric is darker than the sides. This trouble appears regardless of the dye used. We are under the impression that the fault is in the scouring. The goods come out of the dryer in tubular form and are held for some time in this warm condition. We think there may be some action at this stage in connection with fatty substances left in the stock. We are anxious to get some advice on this matter as to causes and remedy, and anything you could tell us regarding methods of scouring, yards per minute goods should travel in dyeing, size of kettle, composition of dye bath, etc., will be appreciated. The stock used in these pieces is old stuff, held in the warehouse since last February, and now that we are getting to the bottom of the batch, the lots are coming up worse and worse. (3992)

The trouble with the samples is uneven dyeing. They seem to have been hurried too much in the dye bath. This class of work cannot be hurried, for the color just shoots on in streaks and there it stays. No matter what make of dye is used the results will be disastrous if the work is not given time enough. The safest procedure is to give the goods a 3 per cent. ammonia bath at 110 degrees for 20 minutes, cool down, add Glauber's salt and dyestuff, run cold 10 minutes, add 3 to 4 per cent. sulphuric acid, run cold 30 minutes; bring to a boil in no less than 1 hour, an hour and a quarter is even better.

The scouring of these fine jerseys is very simple. A good 5-ounce palm oil soap standing about 2 degrees Twaddle will take care of any oil. This should be put directly on the goods

when started in washer, and run from 30 minutes to 2 hours according to the felt wanted. No water, hot or cold, should be run on the goods before soaping, as this sets the oil. An hour and a quarter rinse in cold water after the soap bath will put them in excellent condition for the dye house.

On this class of work if the dye-kettle reel is 30 inches in diameter, it should be run 30 R.P.M. This will run the cloth 75 yards per minute over the reel. This is plenty fast enough for fine jersey cloth.

As to the size of the dye kettle, there are so many different size machines, and they can all be used, that it resolves itself into a matter of good judgment as to the proper quantity of cloth to run in them. Overcrowding will surely result in uneven dyeing. Each piece should have a space of at least 9 inches to run in. If the kettle is narrow, back to front, say less than 5 feet including stuffing box, they should have a running space of 12 inches.

In regard to the time the stock has been in the warehouse, this should have little effect. If the finisher will see that the soap works up into a good lather there should be no trouble in eliminating old grease. Should there be, half a pailful of a good scouring assistant will move it.

Testing Oil Content of Goods

Please advise as to the laboratory method for making a test of oil content in finished wool fabric. (3989)

The usual method of testing oil or fatty matter in finished wool fabric is carried out as follows:

A 5 to 10 gram piece of the fabric in question is first carefully weighed, then dried to constant weight in a drying oven at a temperature of 100 degrees C. or 212 degrees F. It is then transferred to a Soxhlet extractor and extracted for a period of 8 hours with anhydrous ether. The ether extract is then evaporated off and the residue, consisting of oil or fatty matter, is dried in a weighed flask to constant weight at the temperature of boiling water and the percentage of oil or fatty matter is calculated on the dry weight of the goods.

It is oftentimes desirable to make a determination of soap residues in finished fabrics. This test can be made by taking a sample of the cloth that was first extracted with ether as above described, then making a similar extraction, only

using neutral 95 per cent. grain alcohol. Neutral alcohol is then evaporated as in the case with the ether, and the residue, consisting of soap, is weighed as before and the percentage calculated on the weight of the goods.

The Soxhlet extractor referred to above, with flask, can be purchased from any house dealing in chemical supplies and apparatus.

In making the ether and alcohol extractions, under no condition should a flame be used for heating these volatile solvents. An electric hot plate should be used in all cases.

Equipment for Jersey Cloth Finishing

We are desirous of adding finishing machinery for a production of 1,000 yards daily of wool and worsted jersey cloth for outer garments. Can you outline for us the equipment we would need? (3984)

The equipment depends largely upon the exact character of the finish, but in order to be prepared to turn out nearly any finish that might be required, you would need about the following machinery: 2 fulling mills; 1 8-string washer; 1 hydro-extractor; 4 tubular dryers, and 1 calender, besides a turning machine, measuring machine, soap tanks, etc.

Yarn for Knitted Tubing

We are enclosing samples of knitted web, and would ask you to give us what information you can through your valuable paper regarding the same. We would like to know what size and gauge machine it would require to make this; also the size of cotton yarn, and if it is a combed or carded cotton. Also the present price of cotton yarn like this, and the names of a few firms who could supply it. (3991)

Answering this enquiry as accurately as possible, we would say that the machine needed is a ribber or sleever of about 146 needles, cut about 11 needles to the inch and with a 4¾-inch cylinder. The yarn appears to be an 18 carded cotton of pretty good quality. To-day's (December, 1920), price on this is about 38 cents for Southern and 44 cents for Eastern yarn. There are hundreds of firms that can supply it.

The knitting of this piece of fabric is too loose, and the yarn is too light for the gauge to make what is ordinarily called good knitting, but it is all right if a fabric is to be made

at a low price without regard for quality. It may be that this fabric is just right for a special use and satisfies the party perfectly.

Sizing Worsted Warp

I would like information as to the best method and right kind of size to use on 1/30 and 1/40 worsted, from 5,000 to 8,000 ends, on tricotine weaves. We have a Saco-Lowell double dip slasher and experience a lot of trouble with scabs on the yarn. I would appreciate any information you can give me in regard to size and the right method to make this work run successfully in weave room. (3995)

The superintendent of this work in a large worsted mill replies as follows: "Do not have the size too heavy. As it is dipped twice it doesn't require as heavy a size as single dip work. The slashers must be run slowly and be hot enough to set the first dip well on or the value of the second dip will be lost. The squeeze rolls must have a good spongy covering. It should be woven wide enough to cover the roll and be put on in one piece, at least 5 yards long. Otherwise, there is apt to be a size streak every lap of the roll.

"Now about the scabs. The most common cause for them is the size forming a scum in the box when the machine is stopped for any length of time. If this scum is not taken off very carefully, when the machine is started up the roll will pick it up and plaster it on the yarn in a thick scab that is very hard to get off single yarn. Most any size will do this and care is the only thing that will prevent scabs. The size I have used on similar work is:

Arnold Hoffman T Gum	60 lbs.
Potato starch	10 lbs.
Arnold Hoffman Soluble Grease	5 lbs.
Water	100 gals

"In mixing put stock in the size mixer and cover with water. Run until all lumps are broken up and mixing is worked into a smooth paste, otherwise a lumpy size will result with more opportunity for scabs. Then put in the rest of the water and boil for ½ hour; 1 hour is better, but ½ hour will do."

After the above was printed a reader sent in the following:

In regard to Question and Answer 3995, we thought possibly you might be interested in another formula for sizing single 30s and single 40s worsted. We give below formulas

which are being used very successfully by one of the largest worsted mills:

For single 30s worsted:

Potato starch	50 lbs.
British gum B	25 lbs.
Durkee gum	25 lbs.
Sizing softener	6 lbs.
Water	125 gals.

For single 46s worsted:

Potato starch	75 lbs.
Durkee gum	35 lbs.
British gum B	15 lbs.
Sizing softener	8 lbs.
Water	125 gals.

The Durkee gum helps to keep the size in a fluid state and smooths up the yarn, giving a better condition for weaving.

WARREN H. DURKEE & Co.

Equipment for Dyeing Woolen Rags

Will you please give me the following information: (1) What machinery, tubs, etc., would be needed to dye woolen rags? How are they installed? (2) What is needed to dye woolen rags black, and how is the dye mixed? The rags have been carbonized. (3981)

Carbonized woolen rags may be dyed according to any of the three following methods, all of which are good and produce excellent results, but the cost of installation will vary in each case.

(1) Dyeing the rags in open vats and poling by hand. This is possibly the cheapest plan to adopt, but the labor cost may be somewhat higher, and, besides, the condition of the rags after being dyed may not be the best.

(2) Dyeing in rotary machines, where rags to be dyed are moved about in a fixed volume of dye liquor. The manipulation of the rags in machines of this type is so regular and uniform that the rags are in no way injured. This method of dyeing is relatively of low cost, and should be given serious consideration as plans mature.

(3) Dyeing in so-called "pack machines." In such machines the quantity of rags is placed in the apparatus, the cover or lid clamped down, and the dye liquor caused to circulate by

means of a pump. It is possible that the initial cost of such machines will be higher than that of either of the others mentioned.

As to dyeing black on such rags, this is a problem that must be considered in relation to the color of the rags after being carbonized. If the rags are white or otherwise light color the use of an "acid black," such as Buffalo Black NBR, may be used, or with any of the Buffalo "S" mark blacks, all of which dye well with oil of vitriol. This is an important point to be kept in mind, since carbonized rags may be permitted to retain some of the carbonizing acid into the dye bath with corresponding beneficial results—that is, helping along in the dyeing. If the rags are vari-colored then the dyer will have to make a selection of dyes that will offset the predominating colors in the rags. Thus, if the rags have a greenish tone, an orange or red may be necessary along with the black. If the rags are bluish or violet in tone, an orange or yellow becomes necessary.

In installing a plant for rag dyeing, due regard must be paid to the drainage, the water supply and the steam supply. If a rotary or pack machine is used for dyeing the rags may be washed in the same apparatus.

It is difficult to go into minute details regarding this enquiry since no idea is given as to the probable average daily amount of rags that are to be dyed, or the variations or limits in shade. If this information were supplied a more complete and satisfactory reply could be given.

Yarn for Hosiery Machine

I have a Scott & Williams hosiery knitting machine of the K-G model with a 4-inch head, 84-needle cylinder. Will you kindly inform me what count woolen yarn you would recommend to be used on this machine; also what count of cotton yarn? (3996)

Recently in testing an 84-needle, 4-inch and 18-gauge machine, it was found that 2/8s cotton run from single cone was a little too fine to fill the gauge. 2/7s was about right. It is usually a case of fitting the particular stocking board which the mill uses, together with holding a fixed weight. 3/10s heather worsted run from single cones looked to be right for worsted. For woolen yarn we should judge that about 2/20s would be suitable.

Dyeing Mercerized Goods with Sulphur Colors

We would like you to advise us what to add to our sulphur dye in order to improve the luster on mercerized goods. We are using the regular rotary dveing machine and regular method of sulphur dyeing. (3994)

In dyeing sulphur colors on mercerized goods, the action of the dyeing with such colors gives the goods a dull effect. This is mainly due to the nature of the dyestuff itself, as this class of colors possesses the dullest tones.

To improve the luster on the goods, you cannot add anything directly to the dyebath except a little soluble oil, but in the finishing of the goods the luster can be greatly enhanced.

After the goods are dyed to shade and rinsed they are placed in a bath made up with about 3 to 5 per cent. of soap. The temperature should be about 105 degrees F. After running the goods in this bath for 10 to 15 minutes, the dirty soap liquor is allowed to run out. Without rinsing, the goods are then placed in a bath of about 2 to 3 per cent. acetic acid, the temperature of which should be about 100 degrees F. The soapy goods are placed in this bath and run for about 5 minutes. The goods are then extracted without any further washing or rinsing. This treatment is commonly known as a scroop. Lactic acid can be used in place of acetic acid, but this acid is mainly used when finishing blacks only.

A dyer replies to this question as follows: "The usual method for carrying out the operation of brightening after dyeing with sulphur dyes is to use a finishing oil. This is prepared by taking a 50 per cent. Turkey red oil (slightly on the acid side) and adding to it 10 per cent. of a light mineral oil. This, when mixed with water, should give a good emulsion. The goods, after washing, are entered in a bath made up of 5 per cent. of the above preparation, worked at 60 degrees C. for 10 minutes, washed and dried. A soft water should be used, and this is especially true of the water used in the dyeing."

Spots on Dyed Hosiery

We are enclosing herewith one stocking each of men's and ladies' hose, and upon examination you will note that they are spotted. These goods are dyed aniline oil oxidized black and chromed thoroughly, and for the past week or so we have been troubled with the spots. Sometimes the goods come

through dyed perfectly, then again perhaps 50 per cent. of a batch will come spotted. Can you tell us what would cause the goods to come through this way? (4009)

The trouble with these stockings appears to be strictly mechanical; that is, some of the chemicals have splashed upon the goods somewhere during their passage through the dye house, and not necessarily through the dyeing process. It seems that there has not been thorough saturation of the goods by the aniline oil solution, and as a consequence there is not sufficient aniline present to develop a full black when the chroming is reached. This opinion is based upon the fact that the uneven and mottled appearance is chiefly on one side of the stockings submitted.

Stripping Color from Wood Glove Forms

We find that some of the gloves which we have been fulling recently have bled to such an extent that the wooden forms which we put them on while damp have taken up this color and it is impossible for us to put white gloves on these forms without the color drawing into the white gloves.

We would consider it a great favor on your part if you could advise us some chemical which we might procure to remove these stains from the wooden forms, or direct us where we might secure this information. (3397)

From the above question we are assuming that the wooden glove forms are stained by aniline colors which are not very fast to fulling. The chemical to use in removing the dye stains from the wooden forms is sodium hydrosulphite. This chemical is also known as a stripping agent, when used in removing colors from garments, when they have to be re-dyed to a light or medium shade. It can be bought in lump or granular form. It dissolves in hot water and usually a little acetic acid or caustic soda is added to the solution. The choice of acetic acid or caustic soda depends on the class of colors to be removed. Hydrosulphite with acetic acid will remove acid or basic colors easily, while if it is made alkaline with caustic it will remove sulphur or direct colors. However, in either alkaline or acid condition, or alone, it is a very active stripper of colors. It will not destroy or injure the wooden forms to any extent.

A chemist replies to this question as follows: "The trouble which you are experiencing has come up numerous times

One company resorted to brass forms in place of wood. Dyes have the property of soaking into the wood and it would be difficult to overcome it by any chemical treatment that would not in time affect the wood. It is true that there are various stripping agents, etc., that could be used but this would only lead to the trouble already cited. The best suggestion that can be made is to give the forms 2 or 3 coats of a chemical enamel. This has been tried out and worked very successfully. The forms can then be easily cleaned by any known method adapted for the class of dye being used and will always be fresh and clean."

After the foregoing was published a reader sent in the following:

In a recent reply to a question from a mill having trouble with color bleeding from gloves and staining wooden forms to such an extent that it was impossible to use the forms for white gloves, the suggestion was made that a stripping agent be used to remove the color from the forms. A company the writer was connected with several years ago had difficulty with poles used to hang dyed skeins on taking on the color. They used a stripping compound and after well washing hung up some skeins to dry. The result was that where the skeins touched the pole they were lighter in color. Various methods were tried to prevent this, but the wood had taken up the chemical and reacted just enough to lighten the color. It ended in having to discard the poles. I would not want your client to end in this way. E. R. D.

Impurities in Sulphuric Acid

The question cropped up here to-day relative to the merits of sulphuric acid made from brimstone and regular sulphuric acid. The claim was made that sulphuric acid made from brimstone had less impurities and was therefore better than the other kind. Can you give me any information relating to this? (4004)

Sulphuric acid is produced from either brimstone (sulphur) or the mineral pyrites. So-called "brimstone acid" is likely to be of greater purity than "pyrites acid," since the high grades of brimstone now obtainable contain less contaminating impurities than pyrites. The chief impurity in much sulphuric acid is lead, due to the chambers in which it is formed. Arsenic is an impurity that occurs most in "pyrites acid."

Dressing for Silk Veiling

One of our customers is shortly going to manufacture fabrics similar to the attached, which includes open work material of various kinds, such as veils, etc. This silk, as you can readily note, is still in the gum and after the fabric is made, the silk is boiled off; the fabric is then dyed and finished.

After the goods are finished, they are placed on forms which stretch the fabric greatly and it is our understanding in the finishing bath the material is treated with a dressing which fixes the fibers and prevents them from springing back into their original shape after the fabric is taken off the forms. We would like to know if you could give us any idea of the nature of the dressing or compound usually used for this purpose and just how dressings of this kind for this class of work are usually made up. (4000)

The usual dressing for silk fabrics of the kind referred to is gelatine. Refined gelatine is dissolved in water to make a thin, limpid solution, and this is applied to the goods after they have been dyed by immersing directly, and afterwards hydro-extracting. The fabric is then run over the tenter machine, where it is stretched and dried to the proper width. The gelatine solution, as it dries, leaves on the threads composing the fabric a very fine deposit of gelatine, which acts as a binder for the threads, cementing them together, as it were, and preventing the goods from "springing back."

The quantity of gelatine for this process is small, probably ½ to ¾ of an ounce per gallon will be sufficient, but a few trials on a small scale will supply data for large scale trials.

Dyeing Felt Hats

I am dyeing men's hats and have a hard time with my blacks in penetration. Can you tell me of a black that will penetrate easily? (4008)

No black will penetrate a fur felt body unless the body has been properly prepared. With a well manipulated body, and using a dye like Buffalo Black NBR or one of its prototypes, good results should follow. Dyes of this type require shading because when they are dyed straight with the aid of oil of vitriol, they produce blacks having a slightly greenish tone. Sometimes the natural color of the felt body is sufficiently deep and brown to offset the green tone of the black.

Increasing Luster of Mercerized Yarn

Do you know of any method for after-treating mercerized and dyed cotton yarn whereby the luster and general appearance of the yarn is improved? Any information you may give will be greatly appreciated. (4011)

Mercerized cotton in a pure, clean form has a higher luster than can be produced by the addition of any other materials. Sometimes, on account of prolonged boiling, or by mordanting operations, the surface of the fibers becomes dulled and may be partly restored by the use of turkey red oil or other soluble oils, but such treatment is only temporary in effect. Finishing operations, combining heat and pressure, will do much to restore luster, but the best procedure is to regulate the dyeing so that the fiber does not suffer. This is best done by the use of direct dyes, rather than basic or sulphur colors, keeping the dyeing temperature around 180° F. and by the addition of 2 per cent. of soluble oil. It will be found much easier to preserve the luster than to attempt to restore it after it has been destroyed.

Uneven Dyeing on Worsted Knitting Yarn

We have been having considerable difficulty with uneven dyeing, and it has occurred to us that possibly you might be able to assist us. We enclose a sample of our yarn in the oil, and a sample of the same yarn after scouring; also sample of dyed yarn knitted up to show unevenness of dye.

Our method of scouring is as follows: Our 25-stick machine is filled with water and heated to a temperature of 120 degrees. To this we add 10 pounds of Wyandotte yellow hoops soda ash for every 200 pounds of yarn. The machine is then filled with yarn and run 10 minutes. Eight pounds of soap chips, which have been previously dissolved in water are then added, and scouring continues for 30 minutes.

The speed of the machine is 1 revolution in 1½ minutes. The yarn is then rinsed for 15 minutes in water at 120 degrees, and 6 pints of ammonia are added to the bath. The second rinse also requires 15 minutes at 120 degrees without ammonia.

You will note from the above remarks that at no time is the yarn allowed to touch cold water. When filling up for the rinse the water is heated as fast as it runs in.

Dyeing Process.—The machine is filled with cold water, to which is added 20 per cent. of the weight of the yarn in Glauber salts, and the yarn is run 10 minutes. The dye-

stuff is added while the bath is still cold, and the machine is run another 10 minutes. The acetic acid is then turned on and allowed to run slowly into the bath.

The steam is turned on at the same time, and the bath brought up to the boil. After boiling for about half an hour sufficient sulphuric acid is added to bring the color up to shade. The speed of the machine is not changed from the beginning of the scouring operation to the finishing of the dyeing.

We use the best kind of Glauber salts obtainable, and also use water white sulphuric. We have found that some of the commercial sulphuric is packed in iron drums, and for this reason we do not use it.

Our water comes from melting glaciers, within 10 miles of the city, and is probably as pure and soft as any water on the continent. It contains no lime or iron.

In using acid we find that some dyes require only 1 per cent. acetic, while others require 5 per cent. acetic and 2 per cent. sulphuric, or 3 per cent. sulphuric.

We have been told by several experts that all the acid should be added at the beginning and no acid added after the heat is turned on the vat, because acid added on the boiling bath is bound to cause unevenness. On the other hand, we have been told by other experts that the dye must go on very slowly, that the only way this can be controlled is by the addition of small quantities of acid to the bath from time to time.

These experts argue that acid added to a boiling bath cannot cause unevenness because there is very little dye left, and if the batch is even up to that point there is not sufficient dyestuff left to make it uneven after the acid is added.

One of the arguments in favor of adding the acid from time to time which appeals to us is the correct amount of acid to use with a given amount of dyestuff can be more easily determined. For example, if 3 per cent. sulphuric is added at the beginning of the bath, as advised by some experts, we would in some instances be adding 6 times more acid than is needed, as we know from experience that half of 1 per cent. sulphuric is more than sufficient acid for some dyestuffs. We know large dye houses that use the same amount of acid for every batch and we know other dye houses, equally as large, that add the acid as required, and both are satisfied with the results. We have tried both systems and find practically no difference.

We might also add that we have taken great precautions to get clean steam, and before letting the steam into the bath we blow out our pipes to clear them of dirt or scale.

We do not dye anything but worsted yarn in the machine. The machine at one time was lined with copper, but as this

appeared to cause trouble with some of the lighter green shades, we had it removed.

The feed bowl and steam pipes are arranged in the same manner as similar machines in the largest dye houses in this country.

In case it might be thought our difficulty was due to using different dyestuffs which did not blend properly, we might point out that we have had just as much trouble with colors produced from a single dyestuff as we have had from colors produced from a mixture of several dyestuffs.

We have imagined that our trouble was increased since moving into our new dye houses, and have wondered if it was in any way connected with our new boiler. This seems impossible, however, as every precaution has been taken. The boiler is blown down and washed out regularly, and we are running our engine without any lubrication whatever, in order to avoid oil getting into our steam pipes.

If you can diagnose our trouble on the information given above, and the samples sent you, it will certainly be more than appreciated, as the situation is a serious one, and the unevenness occurs so frequently that it is necessary that something be done very quickly. (3999)

After reading this question carefully it seems that the unevenness complained of is probably due to the addition of the oil of vitriol, while the temperature of the dye bath is at, or close to, the boil. All the other conditions of the scouring and dyeing operations appear from the description given to be in conformity with general good practice, but the addition of oil of vitriol to a very hot bath of acid colors is to be questioned.

The best practice when dyeing with acid colors in revolving dyeing machines, is to add all the acid, whether acetic, sulphuric or formic, to the bath before commencing to dye, and to commence dyeing at a temperature of about 85 degrees F., and gradually raise the temperature to the boiling point in about 1 hour. Then continue dyeing at the boil for from 1 to 1½ hours, according to requirements.

The reason for this procedure is obvious. If the dyeing progresses normally under the above conditions, there will be a gradual taking up of the color from the dye bath, as the temperature increases; on the other hand, if acid is added to a hot bath in the presence of wool, the sudden addition of acid at the higher temperature will cause a sudden "jumping on" of the color, which will be taken up quickly by that portion of the yarn that is immersed.

The reverse of this procedure is exactly the same. Should

it become necessary to make an addition of dye to bring up the shade, the dyebath should be cooled, preferably by running some of the liquor off, then adding cold water, while the machine is kept in motion. When the temperature has been lowered sufficiently, the additional quantity of dissolved dye can be poured into the kettle.

Another cause for uneven shades during the application of acid colors is the improper distribution of steam. The inlet pipe for steam should be provided with proper terminals so that there will be no jets of steam striking directly against any portion of the yarn while it is in motion. Wherever a jet of steam strikes skeins of yarn in such a dyebath, there will occur fuller shades.

Our recommendation to this enquirer is to prepare his dyebath with the necessary volume of water, heat to about 85 degrees F., then add the Glauber salt and acid, and while the yarn reel is in slow motion, pour in the dye solution. When this is added, turn on the steam, and within 1 hour have the temperature at, say, 200 degrees F., or a little above. It is a fact that most acid dyes will go on the wool at that temperature and heating to 212 degrees F. will be unnecessary. In this way we believe good level shades will be obtained.

Machine for Tubular Goods

I am looking for a machine or the kind of machinery with which I may be able to manufacture a product, likely of silk, and circular in form when finished, about 5 inches in circumference. The goods must be knitted or woven tight, equal to that of typewriter ribbon, circular, if such a machine can be secured.

Can you tell me where I may possibly be able to secure such machinery, or where I may be able to get this information in case you cannot direct me to the machine company first hand? (4012)

Tubular goods can be made either woven or knitted, but a firmer or tighter fabric can be produced by weaving. Without knowing the exact character of the goods wanted, or the uses for which they are to be employed, it is impossible for us to state whether knitting or weaving would be most suitable. It would be well for the enquirer to send samples to representative manufacturers of knitting machinery and representative builders of the narrow fabric looms, a list of which has been mailed to him.

Misses' Heather Half Hose

I have seen some worsted and heather wool half hose. Would there, in your opinion, be a demand for these in misses' hose, of course, not now but for next winter? What size threads would be necessary for 300-needle, 4-inch, size 9 ribbers, and 150-needle 3½-inch footers, 36 gauge, diameter reducing, according to size. Also let me know what they weigh and what splicing would be good for this grade of hose. (4002)

We think there will be a large demand for worsted and heather wool half hose for misses. We have made inquiry among a number of large jobbers, and they think the same thing. Three hundred-needle ribbers would be the proper gauge, but you are wrong on the diameter. The ribbers should be at least 4¾ inches on size 9. The footers of 150-needle should be 3¼-inch, 36 gauge, reducing according to size. Goods should weigh about 24 ounces on size 7, and the yarn used should be 18s in the ribber, and 12s or 14s in the footers. For splicing you could use the two ends of 18, or in other words, two ends of the same yarn that you would use in the ribber. This would make a very nice hose, and there is no doubt but that there would be a large demand for this number.

Streaks in Face Finished Goods

We are getting streaky goods from our gigs on fine face finished fabrics, and would like some of your experts in gigging to tell us where our trouble lies. We make all our goods of white stock and piece dye them in light shades. Some fabrics are of the Australian wool and some of fine noils, and lately all are streaky. We use single cylinder gigs (English type) and start raising with old work, frequently reversing the cloth, and gradually changing teazle slats to sharper work, and gig the goods quite wet.

Some streaks we are sure are caused by the sockets or staples that hold the teazle rods, but as there are but 3 sockets in the width of the cylinder, and the streaks run lengthwise clear across the cloth, varying in widths from ⅛ to 1 inch, we cannot account for them. Our teazles are very evenly graded and set 2 in a row or 3 in a row according to whether we use 1½-inch to 2-inch teazles, or all button teazles.

We have tried both kinds of setting and see no change in regard to streaks. The goods are given a few runs and then

reversed for a like number of runs, then the slats or rods are changed to slightly sharper work until the goods are sufficiently raised to be wet cropped, after which the raising is completed and the goods brushed down on an up-and-down wet gig containing old teazles in warm water and rolled and steamed before dyeing.

The goods are scoured before fulling and thoroughly washed after fulling, and as they appear to be well cleaned we cannot lay it to dirty goods. While the streaks show to quite some extent before dyeing, they are very pronounced after dyeing. (4016)

It would have been better if this enquirer had sent a short length of the streaky cloth. However, we may mention some sources from which the streaks may arise. The enquirer seems to be doing all that can be done in the gigging with the facilities he possesses, and this has impressed us with the thought that the fault may not be at this process. We understand that the streaks are only in the filling way of the cloth, hence the warp yarn cannot be blamed, neither can the dresser who dressed the warps. But filling yarn from different batches may be getting mixed; also yarn spun from the top and bottom spools of roving. It may be that there are spinners who are tampering with the twisting gear, and thus producing unequally twisted yarn; or there may be faulty lengths of spun yarn, either by reason of faulty roving or defective spindle bands. We advise you to watch these points closely, and also the actions of the filling carrier and weavers. The former may be careless in his manner of steaming and among the weavers there may be some who have a habit of "pumping" the cloth beam. It is also possible that some bobbins of yarn are being spun the reverse way. If a sample of the streaky cloth is sent us it may be possible to give a more definite opinion.

Warmth of a Garment

Will you kindly let us know what qualities of the fabric determine the warmth of a knitted garment? Does it depend upon the absorbent qualities, the conductivity of heat, the weight of the fabric, or any other factor? (4014)

The "warmth" of the garment, of course, depends upon the qualities of the fabric out of which the garment is made, and this is dependent more upon the thickness of the cloth than upon any other quality. The reason for this may be explained

as follows: The thicker a fabric is the greater the amount of air contained between the interstices and the various fibers. This air is a very poor conductor of heat, and the greater the amount of it that is present the greater will be the insulating value or heat-retaining quality of the goods. The absorbent quality of fabrics has some value in increasing the warmth, and the weight of the goods also is a factor. These are less than might be supposed, and considerably less than the value of thickness, either obtained by the size and the method of interlacing the threads, or by napping the goods. The enquirer will find in the June 16, 1917, issue of TEXTILE WORLD, a very interesting article entitled "Testing Blankets for Heat Transmission," by Professor George B. Haven of the Massachusetts Institute of Technology, which gives the result of tests to show the insulating value of cotton and wool.

Allowable Variation in Yarn Sizes

Please advise us how much 12s, 14s, 16s, 19s and 30s cotton yarn should vary in weight. I mean what per cent. on reelings of 200 yards. (4001)

No standards have ever been set covering the allowable variations in weights of cotton yarns. Trade custom allows a variation of about two numbers up and two numbers down. There are difficulties in the way of setting standard variations which would be allowable. For example, in cops, the top and the bottom of the cop may vary from two to three numbers. Under ordinary moisture conditions the same yarn tested at 6 per cent. moisture content and at 10 per cent. moisture content may vary four numbers.

In England, the following variations are allowed on cotton yarns:

1 to 10s	2.5 per cent.
11 to 20s	2.0 per cent.
21 to 40s	2.5 per cent.
Above 40s	3.0 per cent.

There are no similar standards in the United States.

As the enquirer mentions variations in a reeling of 200 yards, it may be mentioned that yarn sized by the lea or skein will not show as much variation as shorter lengths of say 12 inches. This may be due partly to an averaging up process in greater lengths of yarn, and it is also due to the tension in reeling.

Waterproofing on Small Scale

I would like you to send me a recipe for waterproofing cotton fabrics at home. I have a formula which I do not think much of. (4005)

The following process may serve your purpose, as it is used with success in waterproofing fabrics on a comparatively small scale:

Two solutions are required:

Solution 1. Water, 3 gallons; sulphate of alumina, 1¼ pounds. The sulphate of alumina is dissolved in the water and if any residue is found it is removed by straining.

Solution 2. Water, 1½ gallons; sugar of lead, 5 pounds. The water should be hot, and stirring of the sugar of lead should be continued until solution is complete.

These two solutions are now mixed, when a white precipitate forms, which is allowed to settle over night. In the morning, decant the clear top liquor and throw away the white residue, as it is of no value. This clear solution is the liquid used for waterproofing and for this purpose a large stoneware bowl or enameled iron dish-pan is better than anything else. Soak the goods thoroughly in this solution. Then squeeze through a clothes wringer, shake out and dry slowly in the air. When dry, spread the fabrics smoothly on a cloth-covered board or table and steam by ironing with damp cloth under a hot iron, and afterwards iron with a hot iron over a dry cloth. The first ironing steams the chemical on the cloth; the second or dry ironing fixes the result obtained by the first ironing. The goods are now waterproofed.

A publication known as "Farmers' Bulletin 1157," entitled "Waterproofing and Mildew Proofing of Cotton Duck," issued by the Bureau of Chemistry, U. S. Department of Agriculture, Washington, D. C., may be of interest to the enquirer. It may be had by writing the Bureau at Washington.

Inside Coating for Kier

You would oblige us very much by letting us know at your earliest convenience where we could get an inside coating material for a boiling kier. (3870)

We would advise cleaning out the kiers thoroughly at the bottom, lifting up the grate bars and cleaning underneath. If there is any scale, chip it off and then mix up a solution of

lime wash of good consistency, about one pound of lime to a gallon of water. Slack the lime first with a little water and allow it time to swell. Then stir in the water until the lime wash is a little thicker than cream. Then give the inside of the kier a thorough coating of this lime wash. If one coat does not leave it white, give it two coats. If the enquirer is using a caustic or soda ash boil he should give the kiers a good lime wash about twice a week. About every three months the bottom of the kier should be taken up and cleaned thoroughly underneath.

Some mills use Portland cement, and have very good results. They make up a very thin mixture of cement and apply it to the kier with a flat paint brush, allowing it to cool gradually at the normal temperature, and it slowly hardens to a stone-like surface. After it dries and is hard it is smoothed off by rubbing sandpaper over the surface. The kiers are coated only when the plant is about to close down or about once a year.

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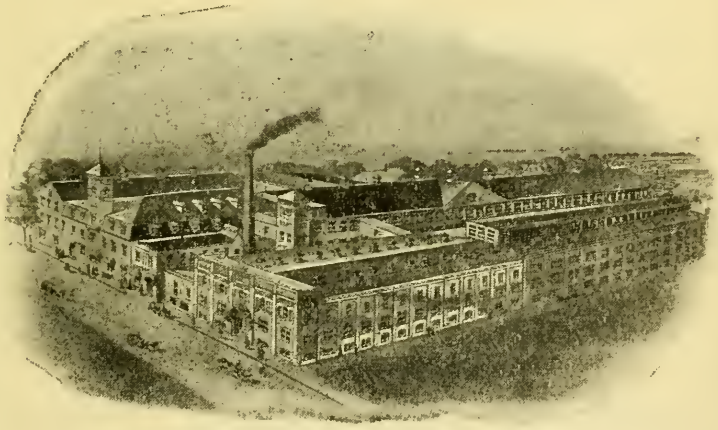

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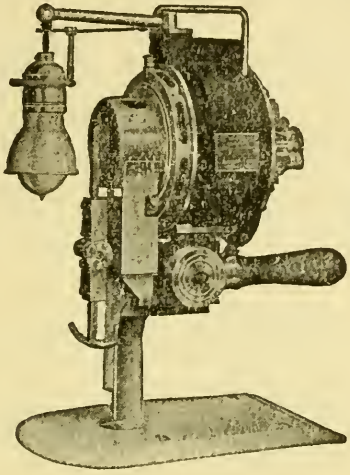

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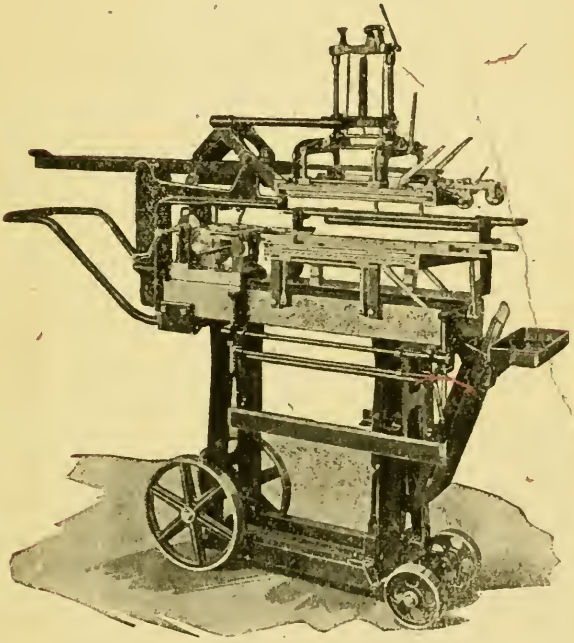

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